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Some new and rare Desmids of the United States.—II.

By L. N. Johnson.

(Plates 232, 233.)

Since the publication of the first paper of this series[1] I have examined a number of collections of desmid-bearing material from various parts of the country. The results of this examination have been to extend very greatly the known range of many species, and to add more than a score to the number reported from the United States by previous writers. Many species are still undetermined and held for further study. Material is also being accumulated which will illustrate the great variability of many species, but this subject will be discussed at another time.

The present paper is based on collections made in New Hampshire, Connecticut, New York, North Carolina, Florida, Louisiana, Michigan, Kansas and California. From some of these States material representing several localities has been examined. I wish to acknowledge my indebtedness to the friends who have responded so kindly to my request for material, and to Prof. Nordstedt, who has aided me greatly by his criticism and advice.

I have thought it best to make one change in the manner of reporting additions to our flora. After every such species is given a number in parenthesis. This refers to a numbered specimen in my herbarium. Thus if any species is incorrectly determined it

[1] Bulletin of Torrey Botanical Club, 21: 285. Je. 1894.

will be possible to see the particular specimen on which the report was based.

The limits of genera among desmids are so unsettled that hardly any two writers agree in all points. Especially is this true of the genus *Cosmarium*. No attempt has been made to settle the points in dispute. In nearly every case the specimens have been compared with the original figures and descriptions. Where the variation from the type is slight varietal names have not been used, as it seems useless to encumber our literature with a long list of varieties, many of which represent simply forms of a variable species.

In the enumeration of species only the more noteworthy ones from the various localities are mentioned, although careful record has been made of all species observed, and specimens have been preserved. Species new to the United Statcs are marked with an asterisk.

Pleurotaenium nodosum (Bail.) Lund. Near Tallahassee, Fla. Scarce. Surface of cell smooth; ends ornamented with a circle of conical-rounded granules.

Docidium verrucosum (Bail.) Ralfs. Frequent in various collections from Florida. Walle's figures do not give a correct idea of this beautiful species. The elevations are nearly square, except those of the terminal circle, which are elongated. The apex of the semi-cell bears a crown of rounded granules. The Florida specimens resemble the figures of Joshua's *D. tessellatum*[2], and it seems to me that the latter must be regarded as a synonym of *D. verrucosum*.

D. coronulatum Grün. Occasional at Meredith, N. H. Several cells were often found joined in series. Diam.=25–35 μ.

This is apparently the same species figured by Wolle under this name. Grünow's original measurements are larger, and the cells as figured by him were slightly different in shape.

Penium annulare West. Baton Rouge, La. Frequent. Found by W. West in material from Maine, and described by him[3]. The

[2] Joshua, W. Burmese Desmidieae, with descriptions of new species occurring in the neighborhood of Rangoon. Journ. Linn. Soc. **21**: 650. *pl. 25. f. 15.* Je. 1886.

[3] West, W. The Freshwater Algae of Maine. Repr. from Journal of Botany 1894: (2) *pl. 315. f. 5.6.* D. 1891.

present discovery extends its range more than a thousand miles. My specimens agree with his description, except that the undulations are less numerous and the cells rather shorter. Diam.=20 μ; length=110 μ. Fig. 1.

* *P. Cylindrus* (Ehrb.) Breb. var. *Silesiacum* Kirch. (532). Wake Forest, N. C. Scarce. Agrees well with the description. Diam. =14 μ; length=42 μ. Fig. 2.

Closterium maculatum Hast. Bridgeport, Conn. Rare. Nearly twice as large as Hastings' measuremcnts, but otherwise agreeing with his description. Striae of minute granules and interrupted irregularly. Diam.=50 μ. Prof. Nordstedt suggests that this species may possibly be a form of *Cl. areolatum* Wood. Fig. 7.

Cl. angustatum Kütz., var. *clavatum* Hast. Bridgeport, Conn. Scarce. Diam.=25 μ. This seems well marked, but only a few specimens were found. Fig. 6.

* *Cl. abruptum* West. (395). Holderness, N. H. Frequent. Variable in length. Occasionally a specimen is longer than West's measurements. Diam.=12 μ; length=84–200 μ. Fig. 5.

* *Cl. Cynthia* De Not. (537). Wake Forest, N. C. Frequent and typical. Striae very fine and numerous. Diam.=12–14 μ; length=100–120 μ. Fig. 3.

Cl. tumidum nov. nom. (416). (*Cl. Cornu* β of Ralfs.[4]; Cl. cornu of Wille[5], but not of Ehrenberg[6]). Burlington, Kansas. Frequent. Diam. usually 12 μ; length=116–120 μ. Occasionally a specimen reaches a diameter of 18–20 μ, representing Wille's forma *major*[5]. West found the latter in Maine. Fig. 4.

Gonatozygon aculeatum Hast. Meredith, N. H. Occasional. Seems to be a well-marked species. Diam.=16 μ; length 300 μ. Aculeae 6–8μ long. Fig. 9.

G. asperum (Breb.) Cleve. (460). Tallahassee, Fla. Rare. West reports it from Maine. The single specimen found was about twice as long as the type, but otherwise the same. Diam.=6 μ; length=260 μ. Fig. 8.

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[4] Ralfs, J. British Desmids. 176. *pl. 30. f. 6 a and b.* 1848.

[5] Wille, N. Ferskvandsalger fra Novaja Semlya. Öfversigt af Kongl. Vetenskaps. Akademiens Forhandlingar, 1879, *pl. 14. f. 80,81.* 1879.

[6] Ehrenberg, C. G. Die Infusionsthierchen als volkommene Organismen. 94. *pl. 6. f. 5.* 1838.

Micrasterias Nordstedtiana Wolle. Meredith, N. H. Rare. Diam = 170 μ. These specimens differ from Wolle's description and figures in that the lobes terminate in two spines instead of three or more. The end lobe is not so emarginate, and the projection on the sides of the neck is larger and nearly cylindrical, ending in two spines. Fig. 14.

M. Mahabuleshwarsensis Hobs. Meredith, N. H. Rare. In same material as the preceding. Rays more slender than in Wolle's figure.

* *Euastrum Sibiricum* Boldt (568). Duval county, Florida. Agrees well with Boldt's description and figures. Diam.= 18 μ; length=20 μ; thick.= 11 μ. It is interesting to find this Siberian species in Florida. Probably it will be found to have a wide distribution, escaping notice because of its small size. Fig. 13.

Dysphinctium viride (Corda) De Toni. (*Cosmarium Cordanum* (Breb.) Wolle.; Desmids of U. S. 1892 edition). Reported from Nova Scotia, and by West from Massachusetts. I find it common in material from Bridgeport, Conn., and Staten Island and Ithaca, N. Y. Diam.= 26 μ.

Cosmarium amoenum Breb. Frequent in collections from Florida, and from Meredith, N. H. Typical.

C. cyclicum Lund. Meredith, N. H. The specimens come close to var. *subtruncatum* Hansg.

C. elegantissimum Lund. Duval county, Fla., and Meredith, N. H. The specimens resemble Lundell's figure [7], though the granules are most commonly only faintly emarginate. Wolle's figures are singularly incorrect in showing a deep linear sinus, though he describes it correctly in this particular. Usually about seven longitudinal rows of granules are visible at once in front view. Diam.= 22 μ; length= 50 μ. Fig. 27.

C. Minneapolitanum Hansg. (*C. protuberans* Lund. var. *granulatum* Wolle) (489). Ithaca, N. Y. Rather larger than Wolle's specimens (diam.= 34–36 μ), but similar in form.

C. margaritatum (Lund.) Roy and Bissett (388). Meredith, N. H. Rare. The drawing does not show the granules well. They should be much larger and closer together. The position of the

[7] Lundell, P. M. De Desmidiaceis quae in Suaecia inventae sunt. 53. *pl. 3. f. 20.* 1871.

hyaline punctations is difficult to make out. They seem to be between the granules in the longitudinal rows. Diam.=72 μ; length =90 μ. Fig. 32.

C. pseudoprotuberans Kirch. New Baltimore, Mich. Rare. Typical. Diam.=32 μ; length=36 μ; isth.=10 μ. West reports this from Maine. Fig. 24.

* *C. costatum* Nordst. (522.) Wake Forest, N. C. Scarce. Diam.=32 μ; length=42 μ; thick.=21 μ; isth.=12 μ. This bears some resemblance to *C. sub-speciosum* var. *validius* Nordst., but is much smaller and with less numerous and larger crenae on the margin. Fig. 31.

* *C. Gotlandicum* Wittr. Burlington, Kans. Occasional. Diam.=28 μ; length=36 μ; isth.=9μ. This may be the same as *C. rectangulare* Grun. (in Rab. Fl. Eur. Alg.), and in that case the latter name should prevail by the right of priority, but it seems to me that the identity of the two is not positively proven. This is reported as occurring in Nebraska[8]. Fig. 26.

* *C. granatum* Breb. var. *sub-granatum* Nordst. (341.) Ann Arbor, Mich. Occasional. Diam.=25 μ; length=36 μ; isth.= 8 μ. Fig. 16.

* *C. Paulense* (Börgesen). (*C. polymorphum* Nordst. subsp. *Paulense* Börgesen). 277. Duval Co., Fla. Scarce. At the suggestion of Prof. Nordstedt I raise this to specific rank, as it seems to differ sufficiently from *C. polymorphum* Nordst. Diam.=36 μ; length=50 μ; isth.=10 μ. Slightly smaller than Börgesen's speci mens and differing slightly in the position of the granules, but seemingly not distinct. In very clear specimens one can see that the wall is hyaline punctate between the five large granules on the front. Fig. 17.

* *C. pericymatium* Nordst. (445). Ithaca, N. Y. Occasional. Differing from Nordstedt's figures[9] in its deeper constriction in side view, but otherwise the same. Diam.=28μ; length=50μ; thick=26μ; isth.=24μ. Fig. 28.

* *C. porrectum* Nordst. (360.) Burlington, Kans. Frequent.

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[8] Contr. from Bot. Dept. of Univ. of Nebraska. New Series III. 46. 14 Je. 1892.

[9] Nordstedt, O. Desmidieae Arctoae. Öfvers. K. Vet. Akad. Forh. 1875: *pl. 7. f. 26.* 1875.

Slightly smaller than the original specimens from Brazil. Diam. =50 μ; length=50 μ; isth.=13 μ. Fig. 30.

* *C. quadrum* Lund. forma. (359.) Plymouth, N. H. Seems to be near var. *minus* Nordst. Semi-cells decidedly reniform at base; sometimes slightly retuse at the apex. Diam.=40 μ; length=44 μ; isth.=14 μ. Fig. 22.

* *C. Raciborskii* Lagerh. (365.) Meredith, N. H. Very rare. The membrane seems faintly granulate in the upper part of the semi-cell, but as the granules were not distinct they were not shown in the drawing. This agrees with the type in shape and surface, but differs slightly in the inner part of the sinus. Diam. =50 μ; length=44 μ; isth.=21 μ. Fig.20.

* *C. subspeciosum* var. *validius* Nordst. (433.) Whitmore Lake, Michigan. Occasional. Diam.=48 μ; length=62 μ; isth.=14 μ. Differs from the original description in having seven vertical rows of granules on the inflation and in the fact that they are in more or less definite horizontal rows also. This hardly seems sufficient ground for separating it as a new variety. Fig. 33.

**C. synostegos* Schaarschm. (437). Bridgeport, Conn., and Sisson, Cal. Common but very minute. The specimens from Bridgeport average 10 μ in diameter, the others 8 μ with length= 11 μ, thick=5 μ. The angles in the Californian specimens do not appear cuspidate. In most cases the sinus gapes little, if at all. This may prove to be a distinct species. Fig. 29.

**C. tetragonum* Naeg. var. *Lundellii* Cke. (512). Ithaca, N. Y. Occasional. Diam.=24 μ; length=42 μ; th.=16 μ. Fig. 21.

**C. Turpini* Breb. var. *podolicum* Gutw. (346). Baton Rouge, La. Slightly smaller than Gutwinski's measurements, but otherwise the same. Diam.=40 μ; length=46 μ; th.=26 μ isth.= 12 μ. Fig. 18.

Staurastrum brachiatum Ralfs. Duval Co., Fla. Rare.

St. brevispinum Breb. Staten Island, N. Y., and Sisson, Cal. Frequent.

St. commutatum Kütz. (349). Duval Co., Fla. Rare.

St. grande Bulnh. Bridgeport, Conn., and Meredith, N. H. Diam.=68–78 μ.

St. trihedrale Wolle. Frequent in collections from Florida, also from Staten Island and Ithaca, N. Y. Diam.=28–30 μ.

Apex of semi-cell sometimes shows three slight elevations corresponding to the three lobes.

ST. PROTRACTUM nov. nom. (*St. grallatorium* forma Wolle[10]) (428). This is certainly not a form of *St. grallatorium*. Wolle gives no note on it, but merely figures it. It may be described as follows: Length slightly less than breadth. Sinus shallow, linear, gaping widely in the outer half. Semicells nearly square with basal angles rounded and armed with two minute spines. Sides nearly parallel. Near the apex each is produced into a stout serrate ray tipped with three spines. Apex of semi-cell truncate, projecting above the rays and bearing several serrations. End view triangular, sides concave, angles drawn out into rays. Surface marked by several rows of serrations. Around the centre of the semi-cell (in end view) six larger bifid or trifid projections. Diam.=50–52 μ; length=44 μ. Whitmore Lake, Mich. Fig. 35.

* *St. leve* Ralfs. (450). Whitmore Lake, Mich. Frequent. Diam.=14 μ; length=18 μ. Fig. 34.

De Toni cites among the localities for this species "Americae borealis (Wolle),[11]" but I cannot find that Wolle ever reported it, and believe this must be a mistake.

* *St. Reinschii* Roy (348). Duval county, Fla. This does not agree exactly with Roy's description, but it comes so near it that I place it here provisionally. The spines are short but distinct. It is smaller than the type. Diam.=24 μ; length=20 μ. Fig. 15

* *Xanthidium antilopaeum* Kütz. forma *Javanicum* Nordst. (324). Ann Arbor, Mich. Diam.=52 μ; length=52 μ; thick.=30 μ; isth. =12 μ. The position and number of spines on the end of the semi-cell is variable, even in the same individual, but they show a tendency to arrangement in a single series. Fig. 10.

X. concinnum Arch. var. *Boldtianum* West. (422). (*Arthrodesmus hexagonus* forma Boldt.)[12] Duval county, Fla. Occasional. Very minute. Diam.=12 μ; length=14 μ; thick=6 μ; isth.= 4 μ. Nearly like Boldt.'s Fig. 17, but with sharper angles. In front view this looks like an Arthrodesmus, but in vertical view it

[10] Wolle, F. Desmids of the United States. *pl. 57. f. 20.21.* 1892.

[11] De Toni, J. B. Sylloge Chlorophycearum omnium hucusque cognitarum. 1227. 1889.

[12] Boldt, R. Bidrag till Kännedomen om Sibiriens Chlorophyllophyceer. Öfvers. K. Vet. Akad. Förh. 1885: 109. *pl. 5. f. 17.* 1885.

shows a marked papilla on each side. It seems to be truly a *Xanthidium*.

X. Tylerianum West. (*X. antilopaeum* Kütz. var. *truncatum* Hast. Wolle in Desmids of the U. S. 1892 edition.) Ithaca, N. Y. Common and typical. Although first described by Hastings, West's name must take precedence, since Hastings published the species merely in a local newspaper.

The following species are believed to be new:

ARTHRODESMUS MICHIGANENSIS n. sp. Fig. 12.

Size medium. Length about one-third greater than breadth. Sinus gaping, broadly rounded, semi-cells being connected by a short neck. Semi-cells sub-elliptical, with the apex of the cell drawn out into a broad truncated lobe, and each end armed with a long slightly recurved spine. In vertical view rhombic elliptical with a long spine at each end. Side view circular. Diam.=24-30 μ; length=36-40 μ; thick=16-18 μ; isth.=7-9 μ. Whitmore Lake, Mich. Frequent. Type in herb. Johnson, 427.

COSMOCLADIUM TUMIDUM n. sp. Fig. 23.

Minute. Length and breadth nearly equal. Cells usually joined in fours by a hyaline, mostly unbranched filament. Greatest diameter of cell placed at right angles to the connecting filaments. Sinus deep, linear; semi-cells hexagonal elliptic, with apex flattened. In vertical view elliptical with slight but distinct median inflation. Side view nearly circular. Diam.=8 μ; length =9 μ; thick=5 μ; isth.=2 μ. Whitmore Lake, Mich. Type in herb. Johnson, 455.

This resembles *C. subramosum* Schmidle, but differs from it in its shorter cell, and in the median inflation of the semi-cell.

I do not feel perfectly sure that *Cosmocladium* should be separated from *Cosmarium*.

COSMARIUM PACIFICUM n. sp. Fig. 25.

Small. Length about one-fourth greater than the breadth. Sinus strongly gaping. Isthmus narrow. Semi-cells sub-elliptical. Sides curving regularly from the base to above the middle, then converging by a sharp angle to form the rounded end. End view elliptical, with no inflation. Side view nearly circular. A single pyrenoid in each semi-cell. Membrane punctate. Diam. =25-28 μ; length=32-34 μ; thick=15-17 μ; isth.=6 μ. Sisson, Siskiyou county, California. Altitude 3000 feet. M. A. Howe coll. Type in herb. Johnson, 402.

This resembles *Staurastrum bienianum* Rabh. var. *connectens* Boldt, but is much smaller, and lacks the short spines near the base of the semi-cells. It seems to be a true Cosmarium. It resembles *C. inflatum* Wolle, differing chiefly in length of cell and curvature of the sides. Wolle's figures are not always accurate, and it may be that this is a form of his species.

COSMARIUM DISPERSUM n. sp. Fig. 19.

Size, medium. Length and breadth about equal. Sinus deep, narrowly linear. Semi-cells semi-circular, with the apex sometimes slightly flattened. Margin gently undulate with about eighteen elevations, often less distinct toward the apex. End view elliptical; side view nearly circular. Two pyrenoids in each semi-cell. Membrane finely punctate. Diam.=40–44 μ; length=40 μ; thick.=20 μ; isth.=11 μ. Found in material from Baton Rouge, La., and from Meredith, N. H., at about the same time. Type (from Louisiana) in herb. Johnson, 347.

BOTANICAL LABORATORY, UNIV. OF MICHIGAN.

Description of Plates 232 and 233.

(Reduced one-fourth in Photographing.)

a=front view, *b*=vertical view, *c*=side view of cell.

1. *Penium annulare* West × 560.
2. *P. cylindrus* (Ehrb.) Breb., var. *Silesiacum* Kirch. × 750.
3. *Closterium Cynthia* De Not. × 560.
4. *C. tumidum* nov. nom. × 560.
5. *C. abruptum* West × 560.
6. *C. angustatum* Kütz., var. *clavatum* Hast. × 320.
7. *C. maculatum* Hast. × 320 (a semi-cell).
8. *Gonatozygon asperum* (Breb.) Cleve. × 320, *a* × 750.
9. *G. aculeatum* Hast. × 320.
10. *Xanthidium antilopaeum* Kütz. forma *Javanicum* Nordst. × 560.
11. *X. concinnum* Arch., var. *Boldtianum* West. × 750.
12. *Arthrodesmus Michiganensis*, n. sp. × 560.
13. *Euastrum Sibiricum* Boldt. × 750.
14. *Micrasterias Nordstediana* Wolle. × 320.
15. *Staurastum Reinschii* Roy. × 750.
16. *Cosmarium granatum* Breb., var. *subgranatum* Nordst. × 560.
17. *C. Paulense* (Börgesen). × 750.
18. *C. Turpini* Breb., var. *podolicum* Gutw. × 750.
19. *C. dispersum* n. sp. × 750.
20. *C. Raciborskii* Lagerh. × 750.
21. *C. tetragonum* Naeg., var. *Lundellii* Cke. × 750.
22. *C. quadrum* Lund. forma. × 750.

23. *Cosmocladium tumidum* n. sp. × 750.
24. *Cosmarium pseudoprotuberans* Kirch. × 750.
25. *C. Pacificum* n. sp. × 750.
26. *C. Gotlandicum* Wittr. × 750.
27. *C. elegantissimum* Lund. × 750.
28. *C. pericymatium* Nordst. × 750.
29. *C. synostegos* Schaarschm. × 750.
30. *C. porrectum* Nordst. × 560.
31. *C. costatum* Nordst. × 750.
32. *C. margaritatum* (Lund.) Roy and Bissett. × 560.
33. *C. subspeciosum* var. *validius* Nordst. × 750.
34. *Staurastrum leve* Ralfs. × 750.
35. *S. protractum* nov. nom. × 560.

The Genus Cenchrus in North America.

By Geo. V. Nash.

Cenchrus is a small genus of grasses containing about a dozen species, found principally in tropical and sub-tropical regions. In the United States it extends into the temperate zone. One species, *C. tribuloides*, the common bur-grass, occurs frequently in sandy soil along river banks, and has a very wide distribution, extending from Massachusetts to Ontario, Minnesota and Nebraska, south to Mexico. It is also found in South America and in Cuba. The other species occurring in the United States are confined to the southern parts of the country, one, *C. echinatus*, extending as far north as North Carolina.

The genus in the United States is readily divided into two well-marked groups, the first containing those forms in which the involucre consists of two spine-bearing valves, more or less concealing and enclosing the 2–6 spikelets, as illustrated in the common *C. tribuloides;* the second has only one species, the involucre consisting of 2–4 rows of erect bristles, the outer shorter than the inner, the single spikelet merely surrounded by the bristles and not enclosed. The single species belonging to this group is *C. myosuroides*, which ranges from Georgia and Florida to Texas, and south through Mexico to South America, where it is very common.

Key to the Species.

Involucre consisting of two spine-bearing valves, enclosing the 2–6 spikelets.
  Involucre armed at base.
    With shorter, generally reflexed spines; pedicels smooth; involucre 2-flowered.
      Involucre globose, pubescent. 1. *C. tribuloides.*
      Involucre ovate, smooth, 2. *C. gracillimus.*
    With erect barbed bristles; pedicels villous; involucre 4–6 flowered. 3. *C. echinatus.*
  Involucre naked at base. 4. *C. incertus.*
Involucre consisting of 2–4 rows of erect slender spines and bristles, at the base of the single spikelet. 5. *C. myosuroides.*

1. CENCHRUS TRIBULOIDES L. Sp. Pl. 1050. 1753.

C. Carolinianus Walt. Fl. Car. 79. 1788. Teste Pursh.

Stems erect or ascending, generally decumbent at base, robust, 2–6 dm. long, branching freely, sheaths generally strongly inflated, smooth, striate, compressed, the lower ones overlapping, the upper shorter than internodes, 3–8 cm. long; leaves 6–12 cm. long, 4–8 mm. wide, smooth or scabrous, flat or slightly complanate; spikes 3–6 cm. long, generally partially included in upper sheaths, densely 6–20-flowered; internodes of scabrous rachis 3–5 mm. long; involucre 2-flowered, globose, pubescent to villous, yellowish to light green in color, smooth at base, spines 3–4 mm. long, slightly to strongly ciliate at base, acutely barbulate at apex; spikelets 6–7 mm. long, generally not exserted beyond the involucre; 1st glume hyaline, triangular, acute, about one-half as long as spikelet, sparingly scabrous, strongly 1-nerved; 2d glume of firm texture, ovate, obtuse, about three-fourths as long as spikelet, scabrous, faintly 5-nerved at base, strongly so at apex; 3d glume firm, ovate, somewhat acute, about equaling spikelet, scabrous, 5-nerved; 4th glume chartaceous, broadly ovate, acuminate, 5–7 mm. long, scabrous at apex, 5-nerved; palet of first flower about as long as glume, 2-nerved, strongly scabrous between the nerves especially toward the apex, empty or enclosing 3 stamens; palet of perfect flower chartaceous, broadly ovate, slightly shorter than glume, faintly 2-nerved, scabrous toward the apex; seed oblong-obovate, 3 mm. long, 2–2.5 mm. broad, compressed.

Extensively distributed in the United States ranging from Massachusetts to Ontario, Minnesota and Nebraska, south to Florida and Mexico. Extremely variable, but its robust habit, generally strongly inflated sheaths and light colored globose involucres will distinguish it from its nearest relatives.

2. CENCHRUS GRACILLIMUS n. sp.

Stems ascending or erect, 3–6 dm. high, simple or occasionally sparingly branched above, slender; sheaths smooth, striate, the lower overlapping, the upper shorter than internodes, 6–7 cm. long, but slightly inflated; leaves complanate, 5–8 cm. long, about 2 mm. broad, acuminate, scabrous on margins and midnerve; spike finally long-exserted, 3–5 cm. long, loosely 3–6 flowered, internodes of scabrous rachis about 1 cm. long; involucre 2-flowered, smooth, ovate, purplish, deeply furrowed and smooth at base; spines purple, 5–6 mm. long, 1 mm. broad at base where they are sometimes ciliate, acutely barbulate at the apex; spikelets about 8 mm. long, exserted beyond involucre for one-third to one-half their length; 1st glume triangular, hyaline, acute, one-half as long as spikelet, strongly 1-nerved, slightly scabrous; 2d glume firm, ovate, acute, 7-nerved, scabrous; 3d glume of firm texture, ovate-lanceolate, acuminate, slightly shorter than spikelet, 5-nerved, scabrous especially toward apex; 4th glume chartaceous, 7–8 mm. long, ovate-lanceolate, long-acuminate, strongly 5-nerved at apex, scabrous for upper half; palet of first flower equaling glume, strongly scabrous, 2-nerved, empty or enclosing three stamens; palet of perfect flower ovate, long-acuminate, chartaceous, a little shorter than glume, 2-nerved, strongly scabrous toward apex; seed oblong, 2.5 mm. long, 1.5 mm. broad.

Florida, occurring in the high pine land, together with *C. tribuloides* and *C. echinatus*, flowering a little earlier than the former and later than the latter. It is readily distinguishable from either, especially when growing in the field, by its long slender purple spines, smooth involucre, very slender habit and closely complanate leaves. Begins to flower early in April. My Nos. 188 and 288, collection of 1894.

3. CENCHRUS ECHINATUS L. Sp. Pl. 1050. 1753.

Stems creeping, erect, 3–6 dm. long, branching; sheaths smooth, striate, inflated, lower ones overlapping, upper shorter than internodes, 8–12 cm. long; leaves 1–4 dm. long, 5–15 mm. wide, smooth or scabrous, flat; spikes 4–12 cm. long, finally more or less exserted, very densely 20–50 flowered, internodes of the scabrous rachis 2–3 mm. long; involucre 4–6 flowered, globose, green to purplish, more or less pubescent, villous at base; spines 3–4 mm. long, barbulate at apex, more or less ciliate at base; bristles at base of involucre numerous, slender, distinctly barbed for their whole length; spikelets 6–7 mm. long, more or less exserted from involucre; 1st glume hyaline, lanceolate, obtuse or acute, one-half as long as spikelet, strongly 1-nerved, sparingly scabrous at apex;

2d glume firm, ovate, obtuse, three-fourths as long as spikelet, 5-nerved, scabrous; 3d glume firm, ovate-lanceolate, acuminate, slightly exceeded by fourth glume, 5-nerved, scabrous; 4th glume chartaceous, ovate-lanceolate, acuminate, 6–7 mm. long, 5-nerved, scabrous at apex; palet of first flower about as long as glume, 2-nerved, strongly scabrous; palet of perfect flower as long as glume, chartaceous, ovate-lanceolate, faintly 2-nerved; seed obovate to elliptical, 2.5 mm. long, 1.5 mm. wide, compressed.

This plant is well marked by its broad flat leaves, and the slender barbed bristles surrounding the base of the involucre, which contains double the number of spikelets found in the other species.

North Carolina to Texas, along the coast.

4. CENCHRUS INCERTUS M. A. Curtis, Bost. Journ. Nat. Hist. 1: 135. 1837.

Stems erect or decumbent at base when young, finally creeping, 3–6 dm. long, smooth; sheaths smooth, inflated, compressed, striate, lower ones more or less overlapping, upper shorter than internodes, 5–9 cm. long; leaves smooth, flat, 4–15 cm. long, 3–5 mm. wide; spike generally exserted, 3–6 cm. long, 8–20-flowered, internodes of the scabrous rachis 2–5 mm. long; involucre 2-flowered, pubescent, ovoid, smooth at base; spines about 3 mm. long, very broad at base, ciliate; spikelets 5 mm. long, more or less exserted from involucre; 1st glume hyaline, triangular, acute, strongly 1-nerved, one-half as long as spikelet; 2d glume of firm texture, ovate, obtuse, about three-fourths as long as spikelet, 5–7-nerved, scabrous; 3d glume ovate, acute, 5-nerved, somewhat shorter than fourth glume, scabrous; 4th glume chartaceous, broadly ovate, acute, about 5 mm. long, strongly 5-nerved and scabrous at apex; palet of first flower about equaling glume, strongly scabrous, 2-nerved, empty or enclosing three stamens; palet of perfect flower chartaceous, ovate, acute, about equaling glume, scabrous at apex; seed oval, 2 mm. long, 1.5 mm. broad.

Ranges from South Carolina to Florida and Texas. The smaller involucre, naked at base, with fewer and shorter spines, readily distinguish this plant from *C. tribuloides* which it somewhat resembles.

5. CENCHRUS MYOSUROIDES H. B. K. Nov. Gen. 1: 115. 1815.

Panicum cenchroides Ell. Bot. S. C. and Ga. 1: 111. 1817.

Perennial from a running rootstock. Stems 6–14 dm. high, simple, or branched above, terete, smooth; sheaths somewhat inflated, 7–14 cm. long, striate; leaves smooth, 1–3 dm. long, 3–8

mm. wide; spikes included in upper sheath, or more or less exserted, densely many-flowered, 5–20 cm. long, internodes of the scabrous rachis 2–5 mm. long; involucre consisting of 1–2 rows of barbed spines as long as the spikelet, subtended by 1–2 rows of barbed bristles one-fourth to one-half as long; spikelet about 5 mm. long, resting on the involucre and equaling its spines; glumes all more less short-pointed by the excurrent midnerve; 1st glume hyaline, triangular, acute, about one-half as long as spikelet, 1-nerved; 2d glume firm, ovate, acute, about three-fourths as long as spikelet, 5-nerved, sparingly scabrous; 3d glume as long as the fourth, firm, ovate, acute, strongly 5-nerved at apex; 4th glume chartaceous, ovate, acute, 5 mm. long, 5-nerved at apex; palet of first flower from one-quarter to one-half as long as glume; palet of perfect flower equaling glume, strongly 2-nerved and scabrous at apex.

Ranges from Georgia (Elliott) to South Florida, western Texas and Mexico.

Juncus scirpoides and its immediate Relatives.

By Frederick Vernon Coville.

In the year 1868 Dr. Engelmann grouped under *Juncus scirpoides* several closely related plants which, from the data now at hand, seem to require separation into four species. In 1880 Dr. Franz Buchenau described one of these as *J. Engelmanni*, and in 1890 another as *J. crassifolius*. I am now convinced that still another should be separated specifically under the name of *J. megacephalus*, published sixty years ago by M. A. Curtis, of Wilmington, North Carolina.

After examining the earlier literature of these plants it has been found necessary to change the current names of three species, in two cases substituting older names, and in one case supplying a new name. The first requirement for a proper disposition of the many published names was the positive identification of Michaux's *J. polycephalus*, published in 1803, which, at different times, has been attached by various authors to nearly a dozen different plants, and has therefore fallen into disrepute and consequent disuse. With our present knowledge of the group, however, the name is capable of positive identification. The current dis-

position of *J. polycephalus* has been to treat it as a synonym of *J. scirpoides* Lam., a species published in 1789; but upon examination of Michaux's work it is found that he described two varieties of *J. polycephalus*, variety *crassifolius* and variety *tenuifolius*, respectively, giving to the former the diagnosis: "Major, foliis multo crassioribus et conspicue compressis." It is clear that this variety, which is the type form of *J. polycephalus*, is one of the two plants known at the present time as *J. Engelmanni* Buch. and *J. crassifolius* Buch. Since the latter species, however, is a plant of the Arkansas-Texas region there can be no doubt that Michaux's *J. polycephalus*, accredited to Georgia and the Carolinas, is the species now known as *J. Engelmanni*, which is abundant in these States, and it is necessary, therefore, to so treat it. Michaux's second variety, *tenuifolius*, was diagnosed simply as "foliis subfiliformibus." Dr. Buchenau, examining a flower from Michaux's specimen[1] of this variety, has pronounced it true *Juncus scirpoides*.

Key to the Species.

Capsule with a true beak, the valves in dehiscence united above by the beak, their margins usually involute.

Uppermost cauline leaf with an almost obsolete blade rarely exceeding 1 or 2 cm. in length. 1. *J. megacephalus.*

Uppermost cauline leaf with a normal blade, few to several cm. in length.

Stamens as long as the inner perianth parts, the anthers exserted between them; leaf-blades slender and terete. 2. *J. scirpoides.*

Stamens considerably shorter than the inner perianth parts, their anthers included; leaf-blades usually stout and laterally compressed or even gladiate. 3. *J. polycephalus.*

Capsule without a true beak, the valves in dehiscence flat and separating throughout, their apices spreading or rarely loosely attached. 4. *J. validus.*

1. JUNCUS MEGACEPHALUS M. A. Curtis.*

Juncus megacephalus M. A. Curtis, Bost. Journ. Nat. Hist. 1: 132. 1835.

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[1] Buchenau, Monog. Junc. 325. 1890.

* After examining a large number of herbarium specimens and observing both plants in the field for several years, I am convinced that Torrey's *Juncus nodosus megacephalus* does not intergrade with *J. nodosus* proper. In view of the earlier *Juncus megacephalus* of Curtis, Torrey's plant is named as follows:

JUNCUS TORREYI nom. nov.

Juncus nodosus var. *megacephalus* Torr. Fl. N. Y. 2: 326. 1843.

Juncus megacephalus Wood, Classbook Bot. Ed. 2: 724. 1861. Not Curtis.

Juncus scirpoides var. *echinatus* Engelm. Trans. St. Louis Acad. 2: 468. 1868.

Juncus scirpoides Carolinianus Coville, Mem. Torr. Bot. Club, 5: 107. 1894.

Plant 30 to 100 cm. high; blade of the uppermost cauline leaf only in very vigorous specimens exceeding 1 or 2 cm. in length; fruiting heads 8 to 12 mm. in diameter; perianth reddish brown above; stamens one-half to two-thirds the length of the perianth, the anthers included; capsule equaling the perianth, its valves united above in dehiscence.

Specimens have been examined only from the southern coast region from North Carolina to Florida, although the plant was accredited by Dr. Engelmann with a range as far north as Maryland.

2. Juncus scirpoides Lam.

Juncus scirpoides Lam. Encycl. 3: 267. 1789.

Juncus polycephalus tenuifolius Michx. Fl. Bor. Amer. 1: 193. 1803.

Juncus echinatus Muhl. Descr. Uber. Gram. 207. 1817.[1]

Juncus echinatus "Muhl." Ell. Bot. S. C. & Georg. 1: 410. 1817.[2]

Juncus macrostemon J. Gay; Laharpe Monog. Junc. 140. 1825.

Juncus scirpoides var. *macrostemon* Engelm. Trans. St. Louis Acad. 2: 467. 1868. Includes the forms *macrostylus* and *brachystylus*.

Juncus scirpoides genuinus Buch. Monog. Junc. 323. 1890.

Plant 20–70 cm. high; leaf-blades terete, 2 mm. or less in thickness, with perfect septa; fruiting heads 8–11 mm. in diameter; perianth 2.5–3.5 mm. long, green throughout; stamens equaling the inner perianth parts, the short anthers exserted; capsule exceeding the perianth, its valves united above in dehiscence.

A species of the coastal plain from New Jersey and eastern Pennsylvania southward through the Atlantic States to Florida and westward to Texas.

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[1] Buchenau (Monog. Junc. 323) has recorded his critical examination of flowers from Muhlenberg's specimen.

[2] There is nothing to indicate that Elliott distinguished *J. megacephalus* from *J. scirpoides*. He undoubtedly included both, if indeed he ever saw the former, under *J. echinatus*.

3. JUNCUS POLYCEPHALUS Michx.

Juncus polycephalus Michx. Fl. Bor. Amer. 1: 192. 1803.

Juncus polycephalus crassifolius Michx. Fl. Bor. Amer. 1: 193. 1803.

Juncus nodosus polycephalus Pers. Syn. Pl. 1: 384. 1805.

Juncus echinatus Muhl. Cat. 36. 1813.*

Juncus scirpoides var. *polycephalus* forma *minor* Engelm. Trans. St, Louis Acad. 2: 468. 1868.

Juncus Engelmanni Buch. Krit. Verz. Junc. 67. 1880.

Plant robust, about 1 meter high; leaf-blades in most cases gladiate, 3–8 mm. broad and with incomplete septa, sometimes merely compressed, narrower and with complete septa; fruiting heads 8–12 mm. in diameter; stamens one-half to three-fourths as long as the perianth, the anthers included; valves of the capsule united above in dehiscence and usually with conspicuously involute margins; the beak well defined, commonly 2 mm. in length and not splitting at maturity.

From North Carolina to Florida and westward through the Gulf States to Texas. This species, on account of its gladiate leaves, has been placed by Dr. Buchenau in the group with *Juncus xiphioides* and *J. oxymeris*, but its true relationship is unquestionably with *J. scirpoides*, as indicated by its flowers and fruit.

JUNCUS VALIDUS nom. nov.

Juncus scirpoides polycephalus forma *major*. Engelm. Trans. St. Louis Acad. 2: 468, 1888.

Juncus crassifolius Buch. Monog. Junc. 326. 1890. Not *J. polycephalus crassifolius* Michx. 1803.

Plant 40 to 100 cm. high, stout and stiff; leaf-blades compressed, but never gladiate, 2 to 4 mm. wide, the septa complete; fruiting heads 12 to 15 mm. in diameter; perianth 4 to 5 mm. long; stamens about one-half as long as the perianth, the anthers included; capsule exceeding the perianth, its valves flat, separating throughout in dehiscence or sometimes slightly united above; no well defined solid beak present.

A plant of the southern prairie region, extending from Arkansas to Indian Territory, Oklahoma, and Texas on the west, and to Mississippi on the east.

* Muhlenberg based his name upon the *J. polycephalus* of Michaux, evidently not distinguishing the two varieties which Michaux included therein.

New Species of Physalis.

By P. A. Rydberg.

In a recent study of the North American species of *Physalis* the following new species have been determined. Since the material is widely scattered in herbaria, I deem it best to publish the descriptions pending the completion of the final monograph.

Physalis subulata n. sp.

Fruiting calyx sharply 5-angled, more or less acuminate, calyx-lobes (at flowering time) lanceolate or acuminate, as long as the tube or longer; plant more or less villous or viscid-pubescent, erect, dichotomously branched, 2–4 decimetres high, stem angular and striate; leaves round-ovate, somewhat oblique at the base, generally coarsely dentate; pedicels shorter than the small corolla, which is 2–3 millimetres in diameter; calyx-lobes shorter than the corolla; fruiting calyx sharply angled and purple-veined, heart-shaped in section.

This is intermediate between *P. Barbadensis* and the South Mexican *P. nicandrioides* Schlecht. From the former it differs in the more glandular pubescence, and the long acumination of the calyx-lobes; from the latter in its smaller rounder leaves, in its calyx-lobes, which are shorter than the corolla, and in the fruiting calyx, which is smaller and not of a firm texture.*

P. subulata has not yet been within the United States, but comes near to its border.

Mexico. State of Chihuahua: C. G. Pringle, No. 1344, 1887 (type). It is in the following herbaria: Columbia College, University of Minnesota and Professor Greene.

Physalis comata n. sp.

Perennial, erect, about 0.5 metre high; pubescence fine and short, that on the calyx, pedicels and upper branches mixed with long white flat jointed hairs; like *P. heterophylla* Nees (*P. Virginiana* Gray, not L.), but leaves smaller, blade not over 0.5 decimetre long, rounded, ovate, scarcely at all cordate at the base, about 5 centi-

* Another related Mexican species is *P. hirsuta* Mart. & Gal., not Dunal. It differs from *P. subulata* in its larger, less veiny fruiting calyx, from *P. nicandrioides* by the calyx, which is not of a firm texture, and from both by its subentire leaves. It most resembles *P. pubescens*, but differs in its subulate calyx-tips.

metres long, thin, somewhat repand-dentate or nearly entire; petioles as long as the leaves; corolla greenish-yellow with brown centre; fruiting calyx as in *P. hederaefolia* Gray, but of thinner texture.

The validity of this as a species may be doubted. It is intermediate between *P. heterophylla* and *P. hederaefolia* and might be placed as a variety of either with about equal right. It, perhaps, most resembles the latter, but differs in the thinner texture of the leaves and the fruiting calyx, in the larger flower and in the long white hairs.

The following localities are recorded:

Nebraska: P. A. Rydberg, No. 269, 1891 (type).

Kansas: E. Bartholomew, No. 2, 1892; E. A. Popenoe, 1875.

Texes: G. Jermy, No. 618, 1890.

PHYSALIS VERSICOLOR n. sp.

Finely pubescent, in age glabrate; stem from a stout perennial root, much branched, at first erect but later spreading, slender, obtusely angled; lower leaves reniform-cordate, the upper ovate, all more or less oblique at the base, sinuately toothed, 2–4 centimetres long, on slender petioles which are generally a little longer than the blade; pedicels slender, about the length of the petioles; calyx-lobes taiangular-ovate, shorter than the tube; flowers about 1 centimetre wide, yellow or drab with brown spots in the centre, turning bluish in drying; fruiting calyx thin, ovoid-cylindrical, reticulate, decidedly 10-angled, 2.5–3.5 centimetres long, generally open at the mouth.

The specimens collected within the United States are more erect, have larger leaves and fruiting calyces than the Mexican. Rare within the United States.

New Mexico: C. Wright, 1851 (Mo. Bot. Gard. herb.).

Arizona: Treadwell, 1879 (Cal. Acad. Sci.).

Mexico, Guaymas: Ed. Palmer, 621 and 622. 1887.

PHYSALIS VERSICOLOR MICROPHYLLA n. var.

Like the species, but leaves only about 1 centimetre long, deltoid, coarsely toothed, peduncles about twice the length of the leaves; fruiting calyx nearly spherical, 1.5 centimetres long, tinged with purple.

Mexico, Guaymas: Ed. Palmer, No. 94, 1887 (herbaria of J. Donnell Smith, of Columbia College, Professor Greene, etc).

PHYSALIS MACROPHYSA n. sp.

Perennial; root somewhat thick and fleshy; stem erect, 0.5–1 metre high, comparatively slender, angled, perfectly smooth, or the upper parts sparingly pubescent with very short hairs; leaves large, thin, 4–8 centimetres long, 2–5 centimetres wide, the lower obtuse, the upper acute or acuminate, on slender petioles 2–4 centimetres long; pedicels 1–1.5 centimetres long, erect, in fruit reflexed; calyx smooth, lobes ovate-triangular or broadly lanceolate, generally a little shorter than the tube; corolla yellow with a dark centre, about 2 centimetres in diameter; anthers generally yellow, sometimes tinged with purple; fruiting calyx large, 3–4 centimetres long, 2.5–3 centimetres in diameter, pyramidal to ovoid-conical, indistinctly 10-angled, deeply sunken at the base; berry small, in the centre of the calyx.

This is nearly related to *P. longifolia* and *P. Philadelphica*, but differs from both by its very large and inflated fruiting calyx and its broader leaves. The following specimens have been examined:

Arkansas: A. E. Heacox, 1889.

Kansas: E. A. Popenoe, No. 68, 1875.

Texas: Lindheimer, 1828; A. A. Heller, No. 1756. 1894.

North Carolina (?): Small and Heller, No. 389. 1891.*

Ohio (?): T. H. Horseford,* 1879; C. W. Short,* garden (?).

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The Nomenclature Question.

BY LESTER F. WARD.

The German who was asked why he called his boy Hans replied:

"Pecaus it vas hees name."

The story is an old one, but no one has ever questioned the conclusiveness of the reply. It is the same answer that must be made to the question why a botanical name should be changed to make it conform to the law of priority. When a child is christened the name he receives is the one that he is supposed to have during life. A man with several aliases is always an object

* These specimens lack fruit and may belong to the preceding, but the leaves most resemble those of *P. macrophysa*.

of suspicion. Is there any reason why the first name that is given to a plant or animal should not always be its name as well as in the case of a human being? It is true that there is this difference, that the poor plant or animal has no choice at any time, while the child after it becomes a man or woman might have something to say if an outsider should attempt to impose a different name. Still it does not seem that the principle is fundamentally changed by this circumstance. If a lost child were to be found and named and brought up by the finder, and he should afterwards learn who his parents were and what his name was, he would very likely insist on being called by that first name. I remember that one of my boyhood playmates was called 'Ed. Wheelock,' but even when I knew him he was aware that Wheelock was not his name, but that of the person who had adopted him, and afterward, having lost him for many years from view, on meeting him again, it was Mr. Edgar Currier with whom I had to do.

Now it seems to me that all we are trying to do is to find out what the name of a plant is. It has happened in so many cases that plants have strayed, as it were, from home, been lost, adopted by strange persons, and given different names, lost for a time again and again found and renamed, and so on, that for us who now know them it is an exceedingly difficult matter to trace their history back and find out who they are. All this is due to the well known vicissitudes of all modern branches of natural history, especially of botany. In this general search for the true parentage and the true names of plants there should certainly be no difference of opinion on the main question and all should admit that what is wanted is to ascertain the real name, for all synonyms are simply aliases, and the only real name is the first name.

Nothing can certainly be more confusing than the existence of a large number of different names for the same thing, and it is no wonder that a movement was set on foot near the beginning of the present century, to endeavor to trace up the true history and find the true names of plants. It is a significant fact that this movement was initiated by a botanist, the great Augustin Pyrame de Candolle, in 1813, in his "Théorie élémentaire de la botanique," from which I translate the following paragraphs:

Page 228: "In order that a nomenclature become universal it

must be fixed, and the fixity of that of natural history is founded on this . . . principle . . . that the first one who discovers an object, or who records it in the catalogue of science, has the right to give it a name, and that this name must be necessarily accepted, unless it already belongs to another object or transgresses the essential rules of nomenclature."

Page 241: "It may be said in general that any name which does not involve a contradiction with the plant, and especially which does not belong to any other species, is sufficiently good to be preserved. The impropriety of a specific name or the possibility of finding more suitable ones is not sufficient to authorize a change."

Page 250, conclusion: "All this scaffolding of botanical nomenclature would crumble at its base and inevitably fall if the great majority of naturalists did not recognize the principle of which I have spoken, viz., the necessity of accepting the name given by the discoverer of a plant whenever that name is conformable to the rules. A name cannot be changed because it has little meaning; for on the same principle the second could be suppressed if a third better one was found, and the third if a fourth should present itself, etc.; thenceforward there would be no longer any fixity in nomenclature, or rather, there would be no longer any scientific nomenclature. The author himself who has first established a name has no more right than any one else to change it for the simple cause of impropriety. Priority, on the contrary, is a fixed, positive limitation, which admits of nothing arbitrary or partial; the most ancient name must therefore be always admitted."

De Candolle, it is true, made five exceptions to this universal rule, some of which would not now be regarded as valid, such, for example, as his exception according to which the name *Lunaria annua** might be changed because the plant is not an annual; but it has not been pretended that de Candolle fully grasped the importance of the movement, but only that the movement is itself in the nature of an evolution to which de Candolle, even that early, gave the initial impetus.

The English mind did not become fully aroused to the subject until nearly thirty years later, but the movement in that country

* This name is accepted in the "Kew Index." [ED.]

was much broader and embraced not merely botany but all branches of natural history.

Such was the "Stricklandian code," adopted in 1842 and otherwise known as the "Rules of the British Association." Among the great names connected with this Stricklandian code are those of Mr. Charles Darwin and Professor Henslow. In 1860 this code was reënacted with only a few changes, all looking to greater success in attaining the same object. Mr. Darwin still served on the committee, likewise Mr. A. R. Wallace, Mr. P. L. Clayton, Professor Balfour, Professor Huxley, and among botanists proper Dr. J. D. Hooker and Mr. George Bentham. A still further revision of the same was made in 1865, and this code now stands, but, strangely, has been supposed to be applicable only to zoölogy, although its provisions were equally applicable to the vegetable kingdom. In the preface of this code occurs this sentence:

"No one person can subsequently claim an authority equal to that possessed by the person who is the first to define a new genus or describe a new species."

In 1867 Alphonse De Candolle presented to the International Botanical Congress, held at Paris, a system of laws of nomenclature, upon which he had been long engaged and which with very few changes was adopted by that Congress. No one certainly could have felt more forcibly the evil effect of the multiplication of plant names than the author of the Prodromus, and in the introduction to these rules he says "in the four volumes of the Prodromus published from 1824 to 1830 the proportion of admitted genera to synonyms was approximately 100 to 55; that is to say, there were at that time about half as many synonyms as admitted genera. In the Genera Plantarum of Bentham and Hooker, fascicles 1 and 2, published from 1862 to 1865, which comprise about the same series of families, I have found in making the same approximate calculation 117 synonyms for 100 admitted genera. Therefore, the proportion of generic synonyms must have doubled in 36 years." This Candollean code was based, like the Stricklandian, on the law of priority and Article 15 of that code is as follows:

"Each natural group of plants can bear in the science only

one valid designation, namely, the most ancient one adopted by Linnaeus, or given after him on condition that it be conformable to the essential rules of nomenclature."

It was a noticeable fact that the Botanical Congress of Paris, which adopted these rules, was not attended by the English botanists, and Mr. W. B. Hemsley in an article in "Nature" for December 24, 1891, says of this Congress:

"In 1867 a Botanical Congress was held in Paris, to which botanists of all countries had been invited, and the most important subject discussed was botanical nomenclature. Mr. A. de Candolle had drawn up a most carefully considered code of rules to govern botanists in their writings; and this code was submitted to the assemblage of botanists, each rule being formulated and modified as the majority deemed wise. Finally the whole was printed and circulated. The fundamental principle of these laws was priority of publication with *adequate* descriptions, and unfortunately it was made retrospective without any sufficiently defined statute of limitations. For reasons of their own the Kew botanists took no part in the proceedings of this Congress; whether wisely or not it would be difficult to determine and fruitless to discuss."

It would be fruitless for me to discuss the reasons which have led the botanists of Kew to manifest so little sympathy with the general movement in favor of reform in nomenclature. Most of these reasons are well known to readers, but, as has already been said, this indifference was not due to any lack of appreciation of the importance of this reform, or of general sympathy with it, on the part of the two great leading systematists of England, Dr. Hooker and Mr. Bentham, who, as we have seen, both signed the Stricklandian code. In fact, no systematist has ever squarely approached the question and given it due attention without arriving at substantially the same conclusion. Dr. Asa Gray in his Structural Botany, page 348, says: "For each plant or group there can be only one valid name and that always the most ancient if it is tenable, consequently no new name should be given to an old plant or group except for necessity. That a name may be bettered is no valid reason for changing it." And on this principle it is worthy of note that against his convictions he maintained

our common blue violet under the name *Viola palmata* L., var. *cucullata* Gray, because he admitted the necessity of taking up an older name if the plant should be given specific rank, saying:

"*Viola cucullata* Ait. ought to have been referred, as an entire-leaved variety, to the Linnaean *Viola palmata*. I am the more constrained to do so now by the fact that the name *cucullata* would have to give way to the much earlier published *V. obliqua* Hill, well figured and unmistakable in his Hortus Kewensis."*

Dr. David Starr Jordan, President of Leland Stanford University and a well-known ichthyologist has said, "There are only two ways of naming plants or animals, either to give them their oldest names or to give them any names you please."† Notwithstanding the general agreement among zoölogists to the principle of the Stricklandian code it was found difficult to enforce these principles unanimously, and in 1876 the question came up afresh at the Buffalo meeting of the American Association for the Advancement of Science, and a new and slightly modified code which had been drawn by Professor Dall was adopted one year later.‡ It deals largely with the multitudinous details of zoölogical science and makes no concessions, but holds the general law of priority as the basis of all sound nomenclature, which is there reënacted and amplified. This code is now, I believe, almost unanimously enforced by zoölogists within the United States.

It does not, however, seem to have covered the case of ornithology, and the ornithologists were still in the worst possible condition in relation to the multiplication of names. At last, losing, as it would seem, all patience with the system in vogue, they met, and by a unanimous action of the American Ornithologists' Union the most stringent code of nomenclature was adopted that has ever been proposed. This is known as the code of nomenclature of the American Ornithologists' Union, published in 1886. The ornithologists had the advantage of perfect unanimity, which is one of the most important conditions to making any code a complete success. The condition of affairs that prevailed before this

*Asa Gray, Botanical Gazette, 11: 254. 1886.

†Botanical Gazette, 20: 163. 1895.

‡Proc. A. A. A. S., 26: 1877. Appendix.

list (1886) is well shown by comparing the lists that preceded it, that is, the lists of North American birds published by Baird in 1859, Coues in 1874, Ridgway in 1881 and Coues in 1882. By taking the first fifty genera given in the American Ornithologists' Union check-list it is found that in only *five cases* has the generic name remained the same from 1859 to 1886. That is, 45 of the 50 generic names (90 per cent.) have been unstable. Since the American Ornithologists' Union list *not one* of these fifty names has changed. The accompanying tabular statement will show more clearly than words the changes in these fifty genera. This complete list embraces 322 genera and about one thousand species and sub-species. In the ten years that have elapsed since its publication it has been found necessary to change only three genera, one sub-genus, three species and one sub-species by action of the law of priority. (See opposite table.)

This truly astonishing result must certainly be highly gratifying to the ornithologists, and the question arises whether botanists can bring about any such result in their department. A feeling in favor of such a movement has been growing stronger and stronger for a number of years, and has at last taken shape in the appointment of a committee of the Botanical Club of the American Association for the Advancement of Science at Rochester, in 1892, who proposed a set of rules of botanical nomenclature with which all are now familiar. The Club also authorized the publication, as an earnest of what the enforcement of these rules might be expected to accomplish, of a list of the plants of northeastern North America. This list is also too familiar to require comment. Of it Professor Bessey has said: "This book is the sign that the day of 'authority' as such, is ended, and the day of 'law' has begun.* All that it seems necessary to say is that there seems to be a misapprehension on the part of some botanists as to the method by which this list was prepared, it being imagined by a few persons that the particular individuals who had most to do with it were in some way personally responsible for the result. It should be known to all that they were merely the instruments in the hands of a large committee, and that every question was submitted to all the members of that committee, even when not in

* American Naturalist, **29**: 350. 1895.

Baird. 1859.	Coues 1874.	Ridgway. 1881.	Coues. 1882.	A. O. U. Check-List. 1886.
Podiceps.	Podiceps.	Aechmophorus.	Aechmophorus.	Aechmophorus.
Podiceps	Podiceps.	Podiceps.	Podiceps.	Colymbus.
Podilymbus	Podilymbus.	Podilymbus.	Podilymbus.	Podilymbus.
Colymbus.	Colymbus.	Colymbus.	Colymbus.	Urinator.
Mormon.	Fratercula.	Lunda.	Fratercula.	Lunda.
Mormon.	Fratercula.	Fratercula.	Fratercula.	Fratercula.
Cerorhina.	Ceratorhina.	Ceratorhina.	Ceratorhina.	Cerorhinca.
Ptychorhamphus.	Ptychorhamphus.	Ptycorhamphus.	Ptychorhamphus.	Ptychorhamphus.
Ombria.	Phaleris.	Phaleris.	Simorhynchus.	Cyclorrhynchus.
Phaleris.	Simorhynchus.	Simorhynchus.	Simorhynchus.	Simorhynchus.
Brachyramphus.	Synthliborhamphus.	Synthliborhamphus.	Synthliborhamphus.	Synthliboramphus.
Brachyramphus.	Brachyrhamphus.	Brachyrhamphus.	Brachyrhamphus.	Brachyrhamphus.
Uria.	Uria.	Uria.	Uria.	Cepphus.
Uria.	Lomvia.	Lomvia.	Lomvia.	Uria.
Alca.	Utamania.	Utamania.	Utamania.	Alca.
Alca.	Alca.	Alca.	Alca.	Plautus.
Mergulus.	Mergulus.	Alle.	Alle.	Alle.
Stercorarius.	Stercorarius.	Megalestris.	Stercorarius.	Megalestris.
Stercorarius.	Stercorarius.	Stercorarius.	Stercorarius.	Stercorarius.
Pagophila.	Larus.	Pagophila.	Pagoph la.	Gavia.
Rissa.	Larus.	Rissa.	Rissa.	Rissa.
Blasipus.	Blasipus.	Larus.	Larus.	Larus.
Rhodostethia.	Rhodostethia.	Rhodostethia.	Rhodostethia.	Rhodostethia.
Xema.	Xema.	Xema.	Xema.	Xema.
Sterna.	Sterna.	Sterna.	Sterna.	Gelochelidon.
Sterna.	Sterna.	Sterna.	Sterna.	Sterna.
Hydrochelidon.	Hydrochelidon.	Hydrochelidon.	Hydrochelidon.	Hydrochelidon.
Sterna.	Anous.	Anous.	Anous.	Anous.
Rhynchops.	Rhynchops.	Rhynchops.	Rhynchops.	Rhynchops.
Diomedea.	Diomedea.	Diomedea.	Diomedea.	Diomedea
Diomedea.		Diomedea.		Thalassogeron.
Diomedea	Diomedea.	Diomedea.	Phoebetria.	Phoebetria.
Procellaria.	Fulmarus.	Ossifraga.	Ossifraga.	Ossifraga.
Procellaria.	Fulmarus.	Priocilla.	Priocilla.	Fulmarus.
Puffinus	Puffinus.	Priofinus.	Priofinus.	Puffinus.
Procellaria.	Aestrelata.	Oestrelata.	Oestrelata.	Aestrelata.
		Oestrelata.	Oestrelata.	Bulweria.
Daption.	Daption.	Daption.	Daption.	Daption.
	Halocyptena.	Halocyptena.	Halocyptena.	Halocyptena.
Thalassidroma.	Procellaria.	Procellaria.	Procellaria.	Procellaria.
Thalassidroma.	Oceanodroma.	Oceanodroma.	Oceanodroma.	Oceanodroma.
Thalassidroma.	Oceanites.	Oceanites.	Oceanites.	Oceanites.
Fregetta.	Fregetta.	Fregetta.	Fregetta.	Cymodroma.
Phaëton.	Phaëthon.	Phaëthon.	Phaëthon.	Phaëthon.
Sula.	Sula.	Sula.	Sula.	Sula.
Plotus.	Plotus.	Plotus.	Plotus.	Anhinga.
Graculus.	Graculus.	Phalacrocorax.	Phalacrocorax.	Phalacrocorax.

session, by sending out circulars, and that the deliberate vote of each member was taken in each case and the questions settled, where not unanimous, by a majority vote. For my own part I confess that I voted with the minority on a number of minor questions, but always with the feeling which I observed to prevail, not only among the members of the committee, but apparently throughout the Botanical Club itself, that minor questions were to be ignored in the presence of the great necessity for the adoption of rules to which all would subscribe. This list, prepared under many disadvantages, is, of course, imperfect in many respects and contains a few features which are especially irritating to those who attempt to use it. I have never known a botanist who was not irritated at the changing of names, yet we have all been obliged during the entire course of our studies to submit to wholesale changes of names at periodical intervals. This is no new thing, as any one may learn by reading the preface to the sixth edition of Prof. Amos Eaton's Manual of Botany, published in 1833. He says:

"It may be asked, why I do not follow De Candolle, *servilely*, since so many distinguished botanists have borne testimony to his great merit? Perhaps no one is a more devoted admirer of his discriminating talents, great learning and untiring assiduity than myself. But he imposes on his readers the labor of learning a multitude of new names without even a shadow of pretence. * * * * As far as I have any influence I pledge it here that the embarrassing innovations of De Candolle and others are of no *possible use* to the science of Botany. All new discoveries, however (which are not a few), *should be adopted;* and they *are adopted* in this edition. And the *necessary* new names and new nomenclature are also adopted and fully explained." (Italicized as in the original).

No one can doubt Professor Eaton's high motive in giving utterance to what he considered so conservative an expression of his views regarding the changes in classification and nomenclature made by De Candolle, and doubtless he considered De Candolle's researches as ill-advised and ephemeral as do some of our estimable contemporaries the Association code of to-day, yet I am constrained to look upon their protests as belonging to no different category than Professor Eaton's.

The botanical world has submitted to frequent changes like those we have known in the past fifty years with very little remonstrance compared to the great annoyance which they produce. In this work a new set of changes is thrust upon us, some of them very great and calculated to appeal strongly to our sense of veneration for the older names which we have so long known, and it is not to be wondered at that those who do not understand that there is any difference between this movement and the long series of changes that have been introduced in times gone by, in the different editions of our manuals and the new botanical works that have appeared, should strongly resent this last proposition to compel us to memorize a new set of names. In America the principal reasons for submitting as tranquilly as botanists have done to the changes that have been imposed has chiefly been the great respect in which all American botanists have held the authors of these books. In the case of Dr. Asa Gray that respect amounted in a very large number of cases to something more—to a real sentiment of personal affection; but this condition of things no longer exists. The argument at best was an unsound one, but one which was nevertheless effective. At the present time botanists must be convinced that any wholesale changes that are to be introduced in the botanical nomenclature of America are made for good reasons.

But, on the other hand, there is now far greater necessity for the adoption of some fundamental rules of nomenclature than have heretofore existed. Formerly there was one high seat from which the botanical decrees emanated, and there was far less danger that unreasonable things would be done by one or two persons than by many. At the present time there are large numbers of botanical centres, and if matters are to be left to the individual judgment of publishing botanists, there will be no comparing the confusion that is in store for us with that which we have had in the past. Heretofore we have only had the differences which one man or one class of men in close coöperation thought best to introduce at different periods in their own work. Now we shall not only have the changes that each individual is likely to make at different dates, but as many differences as there are different sources from which our works are to emanate. It is difficult

under such circumstances to imagine what the condition of things would be were this to go on for several generations. If this ist was as complete and general as that of the Ornithologists' Union adopted in 1886, there is no reason to suppose that the result in botany may not be practically the same as it has proved to be in ornithology, and that with the publication of this one last set of changes, which would be simply a serious attempt to actually find what the true names of our plants are, the long continued process of bandying these plants about from one name to another must cease and each plant would have at last found its true and permanent resting place.

To illustrate in botany as has been done in ornithology we may take several of the editions of Gray's Manual, Sereno Watson's Bibliographical Index and Gray's Synoptical Flora, and make a few comparisons to show the fluctuations that species of American plants have undergone. (See opposite table.)

These are only a few samples taken almost at random of the extensive changes that were made at the different dates given. To mention my own personal experience, I began with the fourth edition of Gray's Manual only a short time before the appearance of the fifth, yet long enough for me to have wasted many precious hours in memorizing names destined to be changed. And then came the Bibliographical Index for the Polypetalae, introducing large numbers of other changes, followed by the Synoptical Flora, carrying the work into the Gamopetalae. The sixth edition of Gray's Manual edited by Mr. Watson often differs from any of the preceding, showing that the general work of wholesale alteration was still going on. Many botanists supposed, as I did at first myself, that all this was necessary and often the authors stated that the reasons for their changes were because the names formerly published were not the original names, thus directly appealing to the law of priority and defending themselves under this law, but a general glance at the whole affair shows there never was really any systematic attempt to base these changes upon any permanent and consistent scientific principles, but that to a large extent it was left to the individual judgment of the author at the particular time at which he was writing. The utter chaos into which this system has thrown the science of botany is the real cause of a movement for a stable nomenclature.

But it would seem that notwithstanding the general spirit of harmony that prevailed in the Botanical Club, and especially in the large committee that it appointed, the work that has thus far been done does not receive the unanimous approval of the working botanists of the country. A circular has recently been sent out bearing the signatures of a considerable number of men whom the science of botany justly honors, which is, in fact, in the nature of a protest against the movement. In urging the "postponement of any radical measures of reform" these gentlemen seem to admit the possibility of reform and perhaps the need of it, but, after a careful reading of this paper, I am obliged to conclude that it is in the main the result of the temporary irritation, already mentioned, which any new attempt to change the names of our plants is certain to produce. Of course, there are other causes arising out of the respective claims of rival universities, etc., etc. Especially is the *argumentum ad verecundiam* very prominent, and I might almost say justly so, since I yield to none in the profound respect which is generally shared for the great and good Dr. Gray, and for the unrivalled work in systematic botany that has been done at Harvard University. But still I am disposed not to permit mere sentiment to stand in the way of the settlement of so momentous a question as the one now before the botanical world, and I must say frankly, with all due respect for the eminent names that are appended to this circular, that I do not regard their general argument as a sound one, and I look upon the circular as little more than an appeal to botanists to preserve the *status quo*. In other words, it seems to be the product of that natural conservatism which always goes hand in hand with the spirit of progress and has its true function of preventing rash actions and hasty revolutions. With this spirit of order I fully sympathize, but at the same time I believe that the time has come for the completion of the reform movement which has merely been arrested, although gradually gaining ground since the date of the Stricklandian and of the Candollean codes. I do not regard the present movement in any sense revolutionary. It is merely an attempt on the part of botanists to secure a uniform system which has not thus far been actually put in practice, except to a limited extent. It is now proposed to practice what has been preached.

Before attempting to discuss any of the so-called principles laid down in this circular, it may be premised that the advance movement should be regarded as essentially one of disinterested principles which only has to oppose what is really prejudice, but may be called by the milder names of sentiment and conservatism. The botanists who approve of these rules have just as much to lose as those who oppose them, and the difference is that they are willing to make this sacrifice, not for their own sakes, but for the sake of the future of botany. Their work is therefore a labor of love. It is opposed to their personal interest, and they represent the class of botanists who are willing for the sake of the future, in which they will have no part, to make a great personal sacrifice. Very few of the older ones will ever be able to rid themselves of the older names with which they are now familiar. Only the very young workers can hope that this action will redound to their personal advantage. Those who oppose this movement, if there be any (and I have no doubt there are) who really see that it might be the last time that serious changes would have to be made in botanical names, would seem to do so purely from a personal disinclination to incur the annoyance of accustoming themselves to a new set of names. It must be admitted that this motive is not as high as we might hope botanists generally to be actuated by. It is probable that some of the signers of this circular think that no stable nomenclature is possible. It is for the benefit of such that I have introduced the argument showing the action of the Ornithologists' Union, and surely no one can deny that it is equally applicable to botany. In so far as any personal rivalry or rivalry between different institutions is concerned I take no interest in it, and arguments of that nature are not only unworthy of an answer, but really admit of no answer.

As regards the familiarity of names and their sanctity on that account, much more is made of it than it deserves. For example, I have been obliged to familiarize myself with no less than four different sets of botanical names in the course of my own work. The first name I learned for a common plant was felt by me to be sacred, and it seemed a sacrilege to substitute another, but when convinced that it was necessary I submitted, and soon the second name became equally sacred with the first, and so on

to the end. Now this is the case with us all in learning the names of our familiar plants. The particular name that we learn for a a plant is all that makes it sacred, and the rising generation of botanists, who will have only before them the actual first name or the real name of the plant, instead of some false synonym that occurs in the present books, will look upon that name with the same veneration as we did upon the false one, and the names that we have learned to cherish will be to them nothing but worthless synonyms. In their case this will be true, whereas in ours we were simply cherishing the names that did not properly belong to the objects to which they were applied.

I have said that the new movement is not only not revolutionary, but is simply in the nature of an evolution which has long been going on. On the contrary, it might be maintained that the so-called principles embodied in this circular, which are alleged to be an expression of conservative views, are really, on the contrary, revolutionary in their character. The following are the principal codes which have been proposed by responsible organizations for the guidance of writers in zoölogy and botany:

De Candolle's Théorie élémentaire de la botanique, 1813.
British Association for the Advancement of Science, 1842.
Association of American Geologists and Naturalists, 1845.
International Botanical Congress, Genoa, 1865.
American Association for the Advancement of Science, 1877.
Société Zoölogique Internationale, 1882.
American Ornithologists' Union, 1883–85.
International Botanical Congress, Genoa, 1892.
Botanical Club, American Association for the Advancement of Science, 1892–93.

The codes adopted by these associations show a steady advance from the idea of giving genera and species names to suit individual taste toward the idea of giving them strictly their oldest names. And the history of nomenclature shows an advance in stability and uniformity corresponding exactly with the thoroughness with which these codes have been carried out. The circular to which reference has been made proposes a new departure in nomenclature, revolutionary in its character and, judging from the history of the science, capable of producing most chaotic results.

It may be said to embody four rules or principles which are opposed to those adopted by the Botanical Club of the American Association. These, which may for convenience be designated the *Harvard rules*, afford a good opportunity for the comparison of the two codes, which every botanist should make for himself deliberately and judicially. It seems eminently desirable that those who have not yet given thought to the subject should understand the full significance of the problem with which the Association botanists have been dealing. The first of them, that relative to ordinal names, it is unnecessary to discuss from the standpoint of the new nomenclature, for no official action on this matter has as yet been taken by the botanical club committee.

The Harvard rules are promulgated after a distinct statement of belief* that no stability in nomenclature is possible, and that the decision as to what names shall be used for genera is to be left to the judgment of individual botanists and not decided by the principle of priority.†

These rules represent the system which for many decades botanists all over the world have been trying to escape, a system which renders the nomenclature of a book thirty or forty years old largely unintelligible, except to the systematist, and which gives every promise of repeating its own history. It is preëminently a *laissez faire* system, and the most that can be claimed for it is that it has served "fairly well." If at the beginning of the present century botanists had adopted a system based on priority, how great would be our obligation to them! Instead of a hundred years of heterogeneous and largely unrecognizable names, we should have had a botanical literature in which a plant would always have had the same name, and ready intelligibility of this literature would be possible to every reader. The botanists of the next century will not, it is hoped, have such a hundred years of constant change to look back upon as we in our time have had.

Some botanists are prone to pin their faith to the arbitrary authority of a standard book, and are holding up that truly magnificent work, the Index Kewensis, now nearly completed, as the safe and only guide in nomenclature. But history shows that the

* Robinson, Botanical Gazette, 20: 103. Ap. 1895.

† Harvard Rules, No. 2 (May, 1895).

influence of such a work is only temporary at best. Where now is the authority of Steudel's Nomenclator, of Pfeiffer's Nomenclator, and to what extent have they contributed to uniformity in plant names? Both these works have filled an important place in the literature of botany, but for the simple reason that they did not bring forward the oldest name as the valid one they have added little to the stability of our nomenclature. It is greatly to be regretted that at the time when the Index Kewensis was in preparation the demand for a stable nomenclature had not yet become sufficiently strong to lead its authors to add principle to prestige and thus insure its permanency as a nomenclator in addition to its inestimable value as an index.

In the prelude to the Harvard rules reference is made to the calling, at an early date, of an International Botanical Congress, presumably for the purpose of "settling" the nomenclature question. It may not be out of place here to urge upon every one who may be a delegate to that Congress, or who may aid in the selection of a delegate, the careful consideration of the fact that no law is stronger than the authority that makes it, and that no authority is stronger in the end than the principle upon which it rests.

A specialist in fungi recently made the admission in conversation, not only that the objections to the new code did not apply in the case of the lower cryptogams, but that the actual application of the code itself would be desirable. The reason given for this was that these orders are not popularly known and hence their nomenclature has not become established by usage. There is the same tacit admission in the language of the Harvard circular:

"These rules [the Harvard rules] are designed to apply only to phaenogams and vascular cryptogams."

In all the lower orders of plants, then, we are to be guided by the law of priority; but as soon as the Pteridophyta are reached, principle is cast aside in favor of sentiment, and because Swartz' name of *Aspidium* happens to be in common use among fern-gatherers, we are enjoined from taking up the perfectly valid designation *Dryopteris* given years previously by Adanson!

Relative to international action it is a matter of gratification to note that recent legislative change has been in conformity with the

American Association principles. The adoption of the first edition of Linnaeus' Species Plantarum, 1753, as the starting point of our system of nomenclature was carried through the Genoa Congress immediately after its adoption at Rochester in 1892. The Austro-German botanists in a meeting held last September adopted another fundamental principle of the American code, the retention of the oldest specific name, under whatever genus published, a principle already put in practice in the later numbers of Engler and Prantl's Natürlichen Pflanzenfamilien.

There are some botanists who hold that the Association rules, although sound, should not be made retroactive. Even in the Harvard rules, three of the four Association rules are expressly admitted to be desirable in future practice. It should be evident to every thoughtful person that if these principles are not made retroactive the desired reform will in no sense be secured. A gardener might with equal wisdom propose to improve a weedy garden simply by preventing the introduction of any more weeds. In the view of the reformers it is necessary to remove the old weeds as well as to keep out the new.

In some respects nomenclatural reform will escape in botany the difficulties that formerly beset it in zoölogy. We have the gratifying assurance that we are not trying an experiment, that the plan is not a merely theoretical one, and that its complete success will unquestionably be attained in botany as it has already been attained in zoölogy. Furthermore, we are able to do in a few years, in one stroke, as it were, what zoölogists, feeling their way over new ground, were many years in accomplishing. All botanists dislike changes in names, and the sooner they can be properly made the better.

There are doubtless some botanists who believe that by general agreement any set of names may be made permanent—that, for example, an International Congress may decide arbitrarily that certain generic or certain specific names are to be considered the proper ones, regardless of any principle. If this were feasible it would be an easy solution of the question, but those who have confidence in such a solution surely cannot have taken into consideration the fact that naturalists and other scientists usually have very little respect for mere authority and very great respect

for principle. This sentiment is constantly growing stronger, and there is every reason for believing not only that a large percentage of botanists would refuse to be influenced by an arbitrary agreement of this kind, but that the ever-growing younger element would within a few years absolutely reject it.

One of the statements made under the second head in this circular deserves special consideration. It is as follows: "While the scope of this rule is left to the discretion of writers, it is urged that generic nomenclature should not at present depart far from that of the three important works, Bentham and Hooker's Genera Plantarum, Baillon's Histoire des Plantes, and Engler and Prantl's Natürlichen Pflanzenfamilien, from which for some time to come our most complete and accurate information as to generic limits and affinities is to be derived." Nothing could better illustrate the present chaos of botanical nomenclature than a comparison of these three great works. It would be interesting to make such a comparison throughout their entire extent, but of course space will not permit of this. We may, however, refer to a few cases, taken principally at random, to show how widely these alleged standard authorities differ in the case of generic names.

BENTH. & HOOK.	ENGL. & PRANTL.	BAILLON, HIST.
Stellaria L.	Alsine L.	Stellaria L.
Wistaria Nutt.	Kraunhia Raf.	Wistaria Nutt.
Petalostemon Michx.	Kuhnistera Lam.	Petalostemon Michx.
Centrosema DC.*	Bradburya Raf.	Centrosema DC.*
Shepherdia Nutt.	Lepargyraea Raf.	Shepherdia Nutt.
Spergularia Pers.	Tissa Adans.	Tissa Adans.
Senebiera.	Coronopus Gaertn.	Coronopus Hall.
Nelumbium Juss.	Nelumbo Adans.	Nelumbo Adans.
Cirsium DC.	Cirsium Scop.	Carduus L.
Echinospermum Sw.	Lappula Moench.	Lappula Moench.

Any one who has the patience to carry out such a comparison to a much greater extent will readily see how little effort has been made by the great systematists named to arrive at the original names of genera, and so long as authorities are privileged to adopt

* Bradburya Raf. is included by Benth. & Hook. and Baillon in a list of "genera dubia." The plants in question are placed under Centrosema DC.

It will be seen that all but one of these names cited from Engler and Prantl accord with those accepted by the Botanical Club's committee.

the names that best please them, there never will be any end to these wide variations.

Here again, as in the more general case above mentioned, it seems to me that the present circular is based wholly upon sentiment. The time has gone by when it was regarded as the important consideration to give special credit to the person who becomes the author of a name. It is no longer a question of credit, but a question of practical utility. The namer of a plant has done nothing more than his duty and while his name should of course stand as the author of that name, botanists are not called upon to violate the rules of nomenclature for the sole purpose of doing him some special honor. The argument that the more important service is that of fixing a species under its proper genus, and that therefore the binomial combination should bear the name of the one who established it falls to the ground, and it becomes of far greater importance that the original namer of the species, or even of the variety, if there be such, be accredited with that name, no matter how many vicissitudes it may subsequently undergo. The rule that the namer of the combination may append his name for the author of the combination, although the last term of that combination may have been named long before by another, seems to be very vicious from a number of points of view. In the first place, if the question of justice were worth considering, it would certainly be a gross injustice to the original namer for another botanist to usurp his rights and take credit for his name; but this is not the chief objection. When I see the names *Nuphar kalmiana* Pursh and *Nuphar kalmianum* Ait., I at once assume that the last name refers to a different plant from the first and that the words "non Pursh" or "not of Pursh" are understood; and when I see written *Spergularia media* Presl. var. *macrocarpa* Gray in one book and *Lepigonum medium* Fries var. *macrocarpum* Wats., I am entirely at a loss who the true author for the variety *macrocarpa* is. What seems to be most needed is some clue to the history of these names, and the particular name should always bear the authority of the one who first wrote it.

But I would like to say here that this whole matter of quoting authority is one of the worst evils of botanical writing. Any one who has the least respect for style must be infinitely annoyed by

the necessity of tacking on one or two abbreviations at the end of a name in order to give his reader an idea of what he is talking about. It makes an ugly cacophony that should not be tolerated any longer than is absolutely necessary. Now, as I understand it, one of the chief objects of this whole movement is, not to lumber up botanical writing with more things of this kind, but to get rid at the earliest possible moment of the whole of it. The ornithologists in adopting one set of names for all birds, the same name always meaning the same bird, and all agreeing that that shall be the case, have already reached the point at which they can write popular articles about birds and omit the authority, thus lending smoothness and grace as well as clearness to their discussions. This should be one of the great aims of botany. Botanists ought to draw up a list, international in its scope and based on a thorough application of the principle of priority, of all the plants known to the world, and all agree that this list should henceforth and forever be adhered to as the authoritative list of all known plants. This once done and subscribed to by all, it would no longer be necessary in any mention that botanists wish to make of any plant known to science to append the abbreviations of the various persons who have had to do with naming it. This surely would be a consummation devoutly to be wished. Of course, in all subsequent names the authority must be given as heretofore, and supplementary lists could from time to time be prepared to embody the results of current research.

But it may be said, and is said by some as a matter of fact, that advocates of the new rules of nomenclature do not adhere to the law of priority, that it has always been necessary to fix a limit or earliest date back of which it is not permissible to go. It seems superfluous to argue this question because the reasons are so thoroughly well known to all, but it may be said in general that in going back to Linnaeus, the founder of binominal nomenclature, and to the particular work of his which is regarded as containing the most complete expression of his law of binomials, we are practically going back, as in the case of the individual, to the birth or first christening of a genus or species. We may go back in language to the time when there were no common nouns and all nouns were proper names. We are told that some rude languages

are still in that condition. Now in ante-Linnaean days there were no true names of plants, certainly not systematic names. All such names may be regarded as trivial or common names, and at the time when Latin was generally written and largely spoken they were scarcely more than vernacular names. Moreover, botanists commenced describing them before they commenced naming them, and the binominal nomenclature is a direct descendant of a system of describing plants. It resulted from the dropping more and more of the adjective terms contained in the character until at last the description consisted of only two names, that of the genus and that of the species. In later times trinominals came more or less into vogue, and as the science advanced it became apparent that the name had little to do with the description, so that although up to this day many or most specific names have a greater or less descriptive value, still large numbers of them possess no such value whatever, and the combination has become simply a name or symbol by which the plant may be known. Elementary as these remarks are, it is upon such facts that is based the reason for fixing some specific standard for the origin of systematic nomenclature, and to all who clearly understand the fact this reason is wholly conclusive.

Since I have commenced the study of fossil plants I have found the same difficulty, and although the science scarcely dates back of the beginning of the present century the nomenclature is in a condition of great confusion. M. R. Zeiller in 1877 encountered this difficulty and expressed himself on the subject in the following clear and trenchant language:*

"The unfortunate confusion that results from these successive changes in the name of one and the same object has taken place the same and in a much greater degree in other older branches of natural history, and to-day the necessity for some remedy is recognized. The only equitable and rational basis that can be adopted is the one that was proposed in 1813 by [A. P.] De Candolle in his Théorie elémentaire de la botanique, in the chapter on Phytography, viz., the maintenance throughout all changes in the

* R. Zeiller, Ingénieur en chef au corps national des mines. Explication de la carte geologique de la France, Tome IV., 2me Partie. Végétaux fossiles du terrain houiller, 1879, p. 5.

genus of the oldest specific name, or, more generally, the absolute principle of the right of priority. In order that the nomenclature may be invariable and universally accepted it must rest upon fixed principles whose application is not subject in any way to arbitrary judgment; thus we should adhere without exception in the case of each genus or species as De Candolle had established it, to the name first in date, even where this name has been recognized as improper and in contradiction with such and such characters of the object or group to which it is applied. Generic or specific names are in fact only designations and not definitions, and if it is admitted that they may be changed because improper, the door is opened to arbitrary action, each author interpreting differently the propriety or impropriety of a name."

I have been engaged for over fourteen years, as time would permit, upon the bibliography and synonymy of fossil plants, and hope ultimately to publish a complete catalogue of all the names that have ever been given to the extinct vegetation of the globe, fully exposing the confusion referred to and adhering strictly in the final revision to the law of priority.

Inasmuch as the representative character of the Botanical Club of the American Association has been called in question, it is of interest to know that some of the opponents of the Rochester movement formerly thought otherwise, as is seen by the following extract from the Proceedings of the Washington Botanical Club of May 7, 1892, which were published in the Botanical Gazette for June, 1892. These resolutions were duly signed by each member of the committee and are preserved in the minutes of the Club.

"At a meeting of the Botanical Club of Washington, held April 23, 1892, a committee was appointed to consider and report upon the questions of botanical congress and nomenclature. At a special meeting called May 7, this committee presented the following report, which was unanimously adopted by the Club:

"Your committee, appointed to consider the questions of a botanical congress and botanical nomenclature, held a meeting on the second of May and prepared the following resolutions:

"*Resolved*, That, while favoring the final settlement of disputed questions by means of an international congress, we do not regard the present as an opportune time, but we recommend the reference of the question of plant nomenclature first to a representative body of American botanists.

"We suggest the consideration, by such body, of the following questions, among others: the law of priority; an initial date for genera; an initial date for species; the principle once a synonym always a synonym; what constitutes publication; the form of tribal and ordinal names; the method of citing authorities; capitalization.

"We recognize the Botanical Club of the A. A. A. S. as a representative body of American botanists and commend to that body for discussion and disposal the subject of nomenclature as set forth in these resolutions."

Respectfully submitted,

LESTER F. WARD,
GEO. VASEY,
F. H. KNOWLTON,
B. T. GALLOWAY,
ERWIN F. SMITH,
GEO. B. SUDWORTH,
FREDERICK V. COVILLE,
Committee.

Missouri Botanical Garden.*

The attention of botanists is called to the facilities afforded for research at the Missouri Botanical Garden. In establishing and endowing the Garden, its founder, Henry Shaw, desired not only to afford the general public pleasure and information concerning decorative plants and their best use, and to provide for beginners the means of obtaining good training in botany and horticulture, but also to provide facilities for advanced research in botany and cognate sciences. For this purpose additions are being made constantly to the number of species cultivated in the grounds and planthouses and to the library and herbarium, and, as rapidly as it can be utilized, it is proposed to secure apparatus for work in vegetable physiology, etc., the policy being to secure a good general equipment in all lines of pure and applied botany, and to make this equipment as complete as possible for any special subject on which original work is undertaken by competent students.

A very large number of species, both native and exotic, and of horticulturists' varieties, are cultivated in the Garden and Arboretum and the adjoining park, and the native flora easily accessible from St. Louis is large and varied. The her-

[*This article has recently been issued as a leaflet. We take pleasure in placing it more permanently on record and in calling the attention of botanists to the valuable facilities for research afforded.—EDS.]

barium, which includes nearly 250,000 specimens, is fairly representative of the vegetable life of Europe and the United States, and also contains a great many specimens from less accessible regions. It is especially rich in material illustrative of Cuscuta, Quercus, Coniferae, Vitis, Juncus, Agave, Yucca, Sagittaria, Epilobium, Rumex, Rhamnaceae and other groups monographed by the late Dr. Engelmann or by attachés of the Garden. The herbarium is supplemented by a large collection of woods, including veneer transparencies and slides for the microscope. The library, containing about 8,000 volumes and 10,000 pamphlets, includes most of the standard periodicals and proceedings of learned bodies, a good collection of morphological and physiological works, nearly 500 carefully selected botanical volumes published before the period of Linnaeus, an unusually large number of monographs of groups of cryptogams and flowering plants, and the entire manuscript notes and sketches representing the painstaking work of Engelmann.

The great variety of living plants represented in the Garden, and the large herbarium, including the collections of Bernhardi and Engelmann, render the Garden facilities exceptionally good for research in systematic botany, in which direction the library also is especially strong. The living collections and library likewise afford unusual opportunity for morphological, anatomical and physiological studies, while the planthouse facilities for experimental work are steadily increasing. The E. Lewis Sturtevant Prelinnean library, in connection with the opportunity afforded for the cultivation of vegetables and other useful plants, is favorable also for the study of cultivated plants and the modifications they have undergone.

These facilities are freely placed at the disposal of professors of botany and other persons competent to carry on research work of value in botany or horticulture, subject only to such simple restrictions as are necessary to protect the property of the Garden from injury or loss. Persons who wish to make use of them are invited to correspond with the undersigned, outlining with as much detail as possible the work they desire to do at the Garden, and giving timely notice so that provision may be made for the study of special subjects. Those who have not published the re-

sults of original work are requested to state their preparation for the investigation they propose to undertake.

Under the rules of Washington University, persons entitled to candidacy in that institution for the Master's or Doctor's degree may elect botanical research work as a principal study for such degrees, if they can devote the requisite time to resident study.

WILLIAM TRELEASE,
Director.

ST. LOUIS, MO., May 8, 1895.

Botanical Notes.

The Pignuts. There is some question as to the exact distribution of the Common Pignut (*Carya porcina* or *Hicoria glabra*) and the related *Carya* or *Hicoria microcarpa*, and the undersigned will be grateful for herbarium specimens and especially nuts with their husks, representing both. In the recently published seventh volume of Professor Sargent's Silvaa, the range of *glabra* is given as southern Maine to southern Ontario, through southern Michigan to southeastern Nebraska, southward to the shores of the Indian River and Peace Creek in Florida, and to southern Alabama and Mississippi, through Missouri and Arkansas to eastern Kansas and the Indian Territory, and to the valley of the Nueces River in Texas. *H. microcarpa* (treated in the Silva as a variety of *glabra*, under the varietal name *odorata*) is said to occur in eastern Massachusetts, Connecticut, eastern and central New York, eastern Pennsylvania, Delaware, the District of Columbia, central Michigan, southern Indiana and Illinois and Missouri.

WILLIAM TRELEASE.

Reviews.

A Monograph of the Mycetozoa. Arthur Lister, F. L. S. London. Printed by order of the Trustees of the British Museum.

Rostafinski's monograph of the Mycetozoa appeared in 1875, and with the appendix described about 230 species. Massee's "Monograph of the Myxogastres" was published in 1892; it

enumerates 430 species. Lister's volume comes to us dated 1894; it furnishes descriptions of 174 species "taken from specimens I have personally examined," and a list is appended at the end of each genus of "species not met with in the quoted collections;" this comprises about 100 species.

The basis of work in all three of these monographs is the same, viz.: *the types of the species of Rostafinski's monograph* in the collections at Kew, in the British Museum and at Strassburg. Of course the continued accession of specimens to these herbaria has augmented the material of each succeeding author, and important contributions appear to have been made to Mr. Lister's resources by several parties on this side the water.

Rostafinski, by reason of his original method, which involved a complete reorganization of the classification, necessarily reduced numerous species of the old writers to the condition of synonyms. Massee in general accepted the species as established by Rostafinski, while at the same time making numerous additions to this list from descriptions and material derived from American sources and elsewhere. Lister, however, while professing to follow in the main the arrangement of orders and genera given by Rostafinski, opens up afresh the question of species and proceeds to make a thorough and complete revision of the works of his predecessors. Upwards of *eighty* of the species of Rostafinski's monograph have disappeared in synonomy, united with other species, becoming reduced two, three and four or more into one. This involves at the same time the abolition of *five* of the Rostafinskian genera.

The manner in which species and genera are disposed of is sometimes remarkable. For example, it is suggested that the single species of the genus *Crateriachea* is but a variety of *Physarum cinereum* Batsch, and "a careful examination of the type specimen of *Heterodictyon mirabile* Rost. leads to the conclusion that it is a form of *Dictydium umbilicatum* Schrad." On page 89 eight Rostafinskian species are excluded from the genus *Chondrioderma*, four of them being unceremoniously dumped into *Trichamphora pezizoidea* Jungh; the single species of this genus is composed of five species of Rostafinski and one of Massee.

Of the numerous American species of Berkeley and Curtis, all

but two or three subside into synonomy. Peck and Rex come off a little better, a paltry half dozen or so being graciously allowed to remain to each. It is George Massee, however, who has to bear the brunt of the crush and to suffer the most acutely. Out of upwards of fifty new species named and described by him, only a single one is allowed to live, with the exception of two or three which are permitted to linger along until Lister can lay his hands on the types. This, too, it will be observed, is in addition to the Rostafinskian squeeze, the sum of which leaves Massee's volume in a sad state of collapse.

If the details of Lister's book are accurate and reliable, and the work is to be accepted as authoritative, then Massee's volume is a tissue of mistakes and blunders and a monument of ignorance—and *vice versa*. There is scarcely an agreement in spore measurements under any of the species, and the discrepancies are often immense. For example, the spores of *Lamproderma irideum* Massee are given in one volume as 11–15 μ, in the other as 6.5–8 μ. The measurements of sporangia exhibit the same diversity. Species appear under one genus in the one volume and under an entirely different genus in the other. *Didymium flavicomum* of Massee becomes *Physarum Berkeleyi* of Lister. The difference in treatment of the elegant genus, *Trichia*, by the two is something appalling; the number of species described by Massee is *thirty*, while Lister recognizes but *ten*. Massee's single genus, *Heterotrichia*, the only one he ventured to establish, is incorporated in *Arcyria ferruginea* Sauter. Two of Massee's species of *Lycogala* are excluded from the Mycetozoa! And *Tubulina spumarioidea* Cooke & Massee is declared to be nothing but the common fungus *Sepedonium chrysospermum* Lk.! The number of species that are occasionally got together sometimes rivals the synonomy of Rostafinski, and possibly a righteous retribution has now fallen on him for having made such havoc with the species of the old writers. For example, in *Physarum compressum* A. & S. are dumped four of Rostafinski's species, two of Berkeley's, three of Massee's and one each belonging to Balfour, Phillips and McBride. *Oligonema nitens* Libert is made a dumping place for eight different species, and he seems to have seriously considered whether he shouldn't dump the whole into *Trichia affinis* De B.

Mr. Lister has made a few attempts at novelties himself, which in the main are unfortunate. It is doubtful if *Physarum murinum* Lister is anything different from *Physarum pulchripes* Peck, as he has it. *Physarum calidris* Lister, on his own showing should be called *Physarum pusillum* B. & C., and the pretext for not doing so is perfectly flimsy. At any rate *Physarum nodulosum* Cke. & Balf. has priority; it was published as *Badhamia nodulosa* in the Journal of Mycology in 1889. If *Hemiarcyria stipitata* Mass. is to be absorbed in *H. clavata* Pers., with more reason should *H. intorta* Lister be included in the same species. The definition of his new order Margaritaceae is illogical; in fact, the order is unnecessary and the genera may easily be distributed elsewhere. The theory of the tubules in *Lycogala* is questionable; but if true the tubules are not a capillitium traversing the *interior* of the sporangia, but only "air-spaces" between them, in which case *Lycogala* goes to Reticulariaceae. The placing of *Chondrioderma* and *Diachaea* in Physaraceae is awkward indeed, and will receive the approval of no one. *Hemiarcyria* is a good Friesian designation much older than *Hemitrichia*. Something is said in the introduction concerning the "laws of botanical nomenclature," but it will be seen that the nomenclature remains a purely *personal* one, and that revision of the generic and specific names in the Myxomycetes is still a thing greatly needed.

We are of the opinion that Mr. Lister has shown too little respect for the labors of his predecessors and has exhibited a great want of consideration for the views and opinions of his contemporaries. We have a lurking suspicion that he is influenced by some strong personal bias greatly to the discredit of many of his statements; possibly it is only a yearning for notoriety. And we are inclined to look upon him as a narrow specialist, disqualified, by reason of his limited studies, for forming a proper judgment concerning genera and species. A. P. M.

Untersuchungen über die Stärkekörner. By Dr. Arthur Meyer. With 99 cuts in the text and 9 plates. Jena, 1895.

This treatise will no doubt be welcomed by all scientific botanists. The author has made an earnest, conscientious effort to clear up some of the mysteries concerning the life history of the individual starch-grain. He admits that some of his conclu-

sions in regard to structure, imbibition, stratification and growth are yet theoretical. Our knowledge concerning the chemistry of starch is especially imperfect. It would be impossible to attempt to give a full summary of the author's investigations and results. The following are perhaps the most important conclusions:

1. The starch-grain consists of amylose, which separates into α-amylose and β-amylose, amylodextrin, dextrin, isomaltose, and maltose. Of these substances amylose is perhaps the true starch-substance; the others are the result of processes of inversion.

2. Starch-grains are sphaero-crystals of amylose and amylodextrin. This is evident from their optical behavior.

3. Amylose is split up by the starch-ferment diastase as follows: with the aid of water, the amylose molecule is converted into two or more molecules of amylodextrin; this is converted into dextrin and isomaltose; a further process of splitting up converts dextrin into maltose, while isomaltose may also revert into maltose.

4. The starch-grain is porous. The pores are scarcely perceptible with the highest magnifying powers. The author makes a special attack upon Bütschli's "Wabenstructur" theory. Among other things he says, "Es ist höchst interessant zu sehen wie ein so vortrefflicher Beobachter (Bütschli) die Schaum und Wabenstructur mit welcher er sich eingehend beschäftigt, in die Objecte hinsieht," which, I think, expresses it rightly.

The following are some of the more important conclusions in regard to the biology of the starch-grain.

1. Starch-grains occur exclusively in the chromatophores. They may occur in any kind of chromatophore. The starch-grain of angiosperms originates and grows from the beginning until its final solution within a chromatophore.

2. Every starch-grain is entirely enclosed by the substance of the chromatophore. The author points out the difficulty of demonstrating the presence of the chromatophore substance.

3. The form of the starch-grain is more or less dependent upon the form of the chromatophore. The chromatophore substance does not always form an even layer over the starch-grain. The thickest portion of the chromatophore always lies in contact with the thickest stratifications of the starch-grain.

4. Several starch-grains may develop in one and the same chromatophore.

5. Solution of the starch-grain within the cell is due to the ferment diastase.

6. Stratification of starch-grains is still not well understood, it is perhaps due to a periodicity of growth (deposition of new layers), and to the action of diastase.

Part IV. comprises monographs on the biology of the starch-grains of *Adoxa moschatellina*, *Hordeum distichum*, *Dieffenbachia Seguine*, *Pellionia Daveauana*, *Hyacinthus orientalis*, *Oxalis Ortgiesi* and *Cyrtodeira cupreata*.

The treatise, which comprises 318 large octavo pages, is written in clear scientific style. Some of the cuts are poor. Taken as a whole, it is certainly the standard work on starch. It shows a great advance made since Nägeli's memorable communications on the same subject. ALBERT SCHNEIDER.

Catalogue of Ohio Plants. W. A. Kellerman and William C. Werner (Geology of Ohio, 7: Part 2, 56–406. 1895).

Since the publication of Dr. Beardslee's "Catalogue of the Plants of Ohio" in 1874, a great amount of botanical exploration and critical study of the flora of the State has been accomplished, no less than 110 published papers and references to the plants of the area, during that period, being cited in the work here noticed. It was therefore highly desirable that these records should be brought together and incorporated with the unpublished results of the recent work of Professor Kellerman, his students and associates in the region. The duty has been discharged in a thorough and painstaking manner, as evidenced by the fine volume which lies before us, and we tender its authors the cordial congratulations of American botanists upon its completion.

The chapter on bibliography cites the titles of 132 papers and references, all but two or three of which have been examined. The arrangement of the families is that of Engler and Prantl, but in a reverse sequence, beginning with the Compositae and ending with the Myxomycetes. The nomenclature is based on the principles adopted by the Botanical Club of the American Association for the Advancement of Science. N. L. B.

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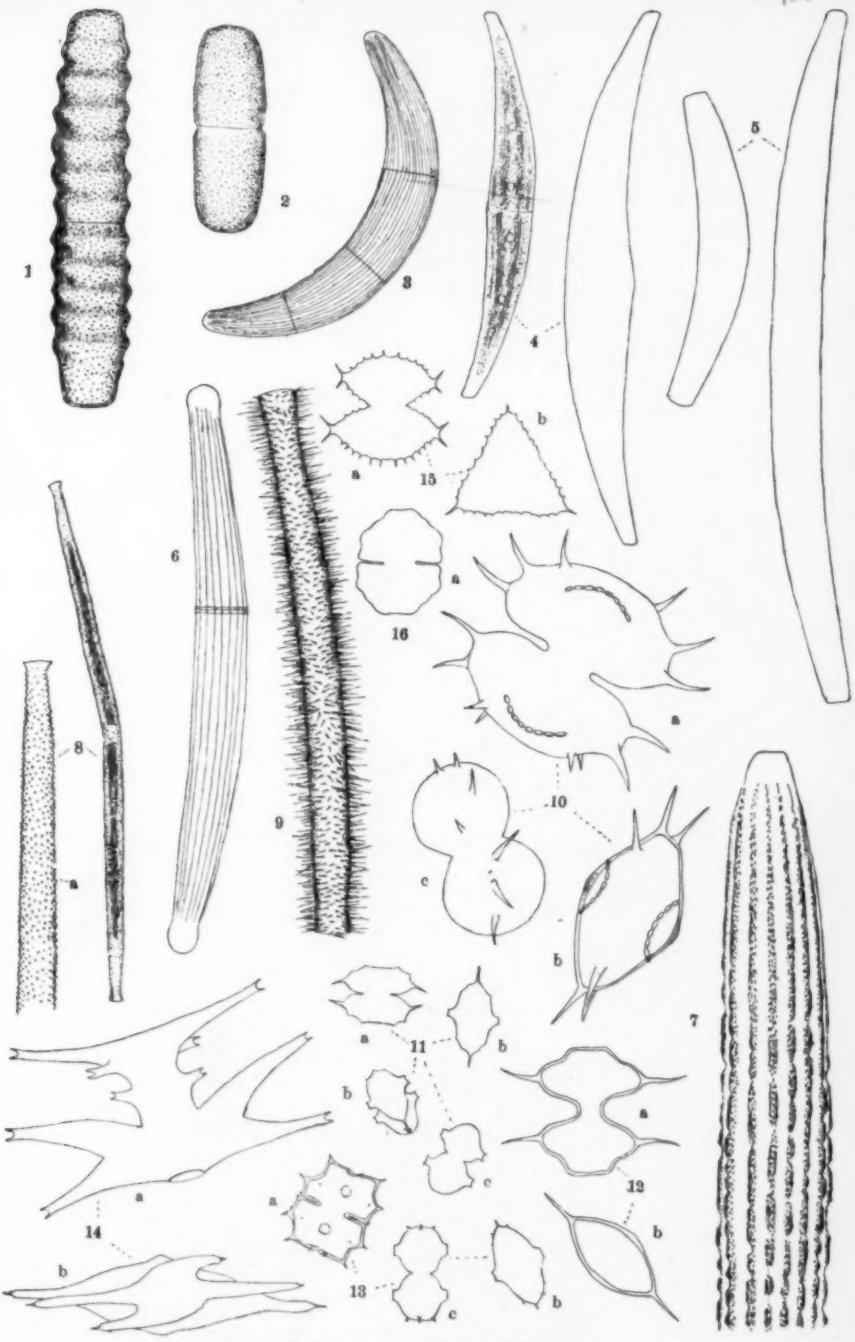

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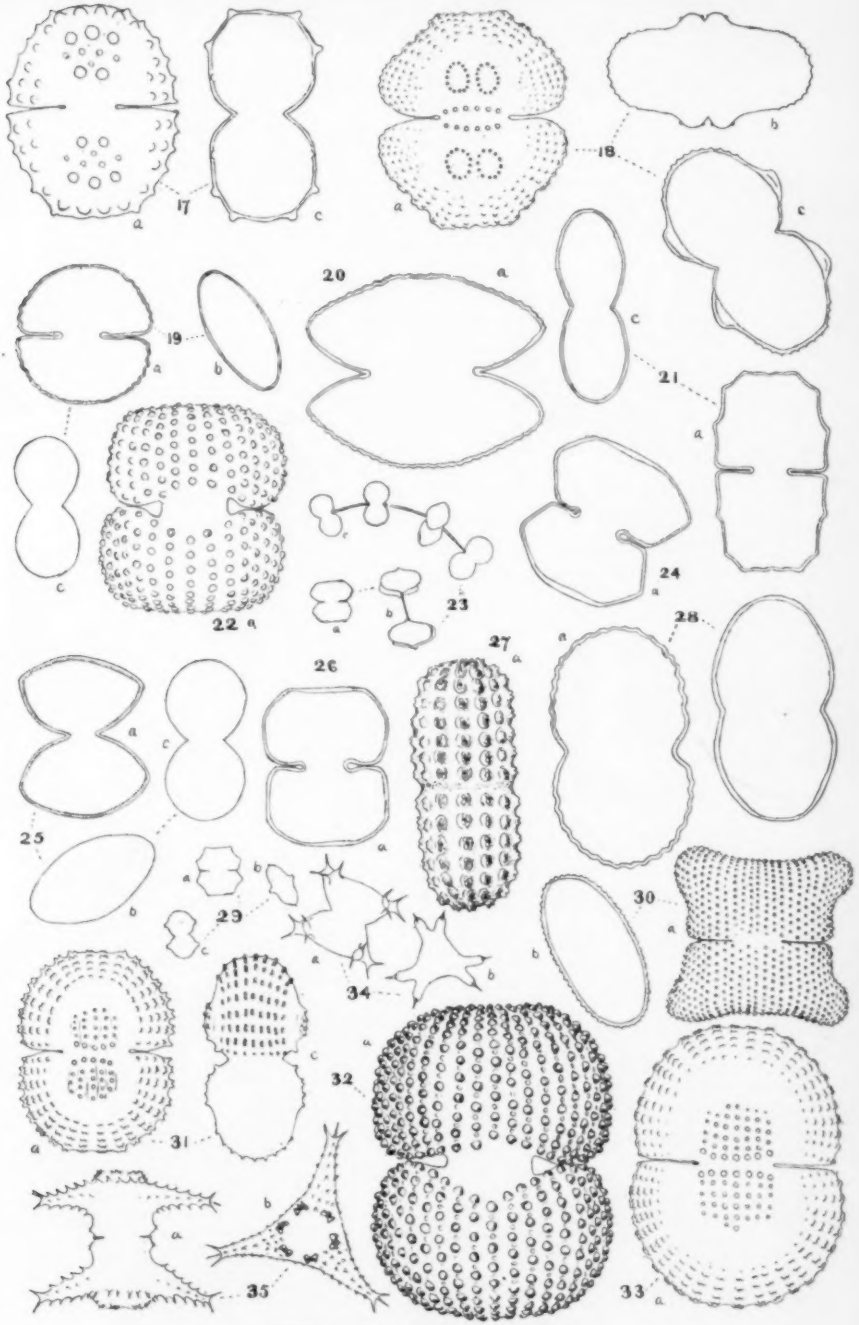

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